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ABSTRACT

The investigation was designed to determine the effectiveness of day care intervention on the use of intentional communicative behaviors by 26 twenty month old low socioeconomic status infants at risk for developmental retardation, and to compare their communicative development to a group of 14 normally developing middle class infants. Literature was reviewed on the origin and etiology of the notion of "high risk" infants and on relevant variables as possible contributors to developmental delay. The review revealed that the age at which high risk infants begin to deviate from other infants is around 18 to 24 months, which coincides with the onset of the use of single words in language development. First, the total frequency with which the infant initiated a communicative act to the mother during a free play interaction situation was determined. Two different functions of communication were observed in two separate settings--first, a measure of the infant's use of the "showing" function of communications was obtained in a free play interaction with the mother and second, a measure of the infant's use of the "requesting" function of communications was obtained during an experimental communications task. Measures of the infants' social development were also obtained for three variables: the amount of time the dyad played or read together, the amount of time the mother read alone, and the frequency of the mother's attempts to modify the infant's behavior or activity. For the infants observed in the study, day care intervention did influence communicative behaviors. Results did not support the notion that there are cognitive prerequisites to language. In addition, an inconsistent relationship was found between the infants' performance on the subscales of the Uzgiris and Hunt Ordinal Scales as a measure of sensorimotor development and their performance on the measures of communications. The study did support the notion that environmental factors can positively affect the development of early communicative development. Additional study data are appended. (SBH)

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A COMPARATIVE STUDY OF INFANTS AT-RISK FOR MENTAL RETARDATION AND THE EFFECTS OF DAY CARE INTERVENTION ON THE DEVELOPMENT OF COMMUNICATION SKILLS

by

Joanne Curry O'Connell

A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the School of Education.

Chapel Hill

1980

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JOANNE CURRY O'CONNELL. A Comparative Study of Infants at Risk for Mental Retardation and the Effects of Day Care Intervention on the Development of Communication Skills. (Under the direction of DALE C. FARRAN, Ph.D.)

The purpose of this investigation was to determine the effectiveness of day care intervention on the use of intentional communicative behaviors by a group of 20-month-old low socioeconomic status infants at risk for developmental retardation, and to compare their communicative development to a group of normally developing middle-class infants.

A total sample of 40 infants was observed to determine group differences on two main variables. First, the total frequency with which the infant initiated a communicative act to the mother during a free play interaction situation was determined. It was expected that high-risk control infants not attending day care intervention would initiate communicative acts significantly less often than either the high-risk experimental infants attending day care or the middle-class infants. This hypothesis was confirmed in this study.

The second major variable was concerned with determining whether or not the three groups could be differentiated on the developmental level at which they communicated. Two different functions of communications were observed in two separate settings. First, a measure of the infant's use of the "showing" function of communications was obtained

from a free play interaction with the mother; and second, a measure of the infant's use of the "requesting" function of communications was obtained during an experimental communications task (Snyder, 1976). This resulted in the proportion of communicative initiations used by the infant in each of four developmentally-based categories for both the "showing" and "requesting" functions (Snyder, 1976). A test of proportions on both communicative functions revealed the following:

1. High-risk experimental infants were communicating at a significantly higher level than high risk control infants on both the "showing" and "requesting" behaviors.

2. High-risk experimental infants were communicating at a level equal to middle-class infants on the "requesting" type behaviors.

Several secondary questions were posed in this study which were concerned with the relationship of early communicative behaviors to other nonlinguistic factors. The developmental level at which the infants were communicating was inconsistently related to the infants' general mental development, depending on the type of communicative function used in the analysis. That is, general mental development was related to measures of the "requesting" function, but not to measures of the "showing" function.

The relationship between the infants' sensorimotor

developmental level and his/her early communicative level was also assessed. An inconsistent relationship was found for different sensorimotor scales. For the "showing" function, two subscales were significantly related (vocal imitation and object schemes) to the communicative measures.

Measures of the infants' social development were also obtained from the free play interaction situation with the mother. Three main variables were coded: (1) the amount of time the dyad played or read together; (2) the amount of time the mother read alone; and (3) the frequency of the mother's attempts to modify the infant's behavior or activity. No relationship between these measures and the infants' level of communicating was found.

General conclusions were presented concerning the effects of day care intervention on communicative behaviors. The major implications of this study are in terms of their importance for stimulating further research on the significance of early communicative behaviors for later language acquisition, and the potential importance of educational intervention strategies for developing early communicative behaviors in handicapped children.

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CHAPTER I

INTRODUCTION

Rationale

It has been estimated that as many as 80% of school-aged mentally retarded children fall into the category of "cultural-familial retarded". The realization of strong correlates between this type of mental retardation and low socioeconomic class status resulted in a decade of research on the effects of early intervention for ameliorating the performance of these children in school. Unfortunately, global intellectual measures were the primary, if not the only, source of comparison between high-risk children and normally developing children. The use of single, discrete measures has left us with very little information about the processes involved that may be influencing the development of these children and how these processes interact with the environment.

There is increasing indication that problems with the process of developing language may account for at least part of the subsequent delay in high-risk children. Although we do not know at what age this development is most critical, longitudinal intervention studies, using

cognitive assessment measures, show sharp declines in I.Q. scores around 18 to 24 months of age. This coincides with the period of development when children begin to learn to talk and show their understanding of the meanings and functions of language in a communicative context.

For educators, there is a critical need to determine whether early intervention affects the processes of learning the meaning and functions of language. The linguistic environment and instructional strategies used in early day care intervention programs are geared to facilitate the development of communicative behaviors. Even the child's preverbal communicative behaviors, such as gestures, eye contact and vocalizations, may develop at an advanced rate in a facilitating environment. Recent advances in psycholinguistic theory and research give evidence that these preverbal behaviors are necessary for later verbal language in a social communicative context. Thus, if the effects of day care intervention on the communicative behaviors of infants, who are learning language (18 to 24 months of age), were identified and observed, interventionists would have a beginning understanding of the importance of the development of communicative skills for the young handicapped child.

Research Overview

The purpose of this investigation was to determine the effectiveness of day care intervention on the use of intentional communicative behaviors by a group of 20 month old infants at risk for developmental retardation. Their communicative behaviors were compared to those of a normally-developing middle class sample.

Recognition of a high incidence of mild mental retardation among children from low socioeconomic status backgrounds led to a wealth of investigations on the etiology and cognitive development of these children. A review of relevant studies indicated that infants at risk for mental retardation could be differentiated from middle class infants at about 18 to 24 months of age on cognitive measures. Measures of the language development of low socioeconomic status children (three years of age or more) and very young infants provide evidence that language factors may be important.

The importance of early language development is supported by recent psycholinguistic studies. A review of the descriptive and empirical studies on the development and use of early communicative behaviors indicated that young children learn to communicate in a social context before they begin to use words. These studies suggested that delay in the development of communicative behaviors may affect later language development.

The relationship between cognition and language is another issue of concern. A review of studies attempting to identify the prerequisite nature of cognition or the relationship between cognition and language during the sensorimotor period has resulted in inconsistent and inconclusive evidence. The present study addressed this issue as it relates to low socioeconomic status infants.

A review of the relationship between socialization, as a nonlinguistic factor contributing to language development, and the development of early communicative behaviors was conducted. Studies pertaining to the interactive behaviors of the mother and infant were reviewed and suggested that mother-child social interactions may facilitate early communicative development. The present study assessed the relationship between maternal behaviors in a free play situation with their low socioeconomic status infants at it relates to early communicative development.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

This chapter reviews two areas of current knowledge about infants at risk for developmental delay: first, the issues related to the origin and etiology of the notion of "high risk" infants; and second, a review of relevant variables as possible contributors to developmental delay. In view of the fact that the literature suggests the development of language to be a crucial factor related to early developmental delay, this chapter will also review literature related to: (a) early normal language development and pragmatics; (b) cognition and its relationship to early language and communications; and (c) socialization, as it relates to early language and communication.

On the basis of this review, two major hypotheses are derived that deal with the efficacy of early intervention as it affects the frequency with which high risk infants intentionally communicate to their mother and the developmental level at which this is done. In addition, several questions evolve that deal with the relationship

of early language and communications to other nonlinguistic factors.

Infants at Risk for Developmental Retardation

Etiology and Identification

"Cultural-familial" retardation is a term used in research and practice to refer to nonorganic mild mental retardation. This elusive form of retardation has a medically indeterminable etiology, yet it represents 70-90% of all mentally retarded individuals in the United States (Dunn, 1963; Mercer, 1974). The term is most often associated with children who are functionally retarded during their school age years. In the absence of demonstrable pathology of the central nervous system, functional retardation has been almost exclusively measured by standard intelligence tests, with measured intelligence falling in the range of 50-70 IQ (Bronfenbrenner, 1975; Garber, Note 1).

The "culturally-familial retarded" label emerged out of several investigations which found a statistical association between mental retardation and certain characteristics of subgroups in the general population, particularly the family history and their economic, psychologic, or demographic characteristics (Girardeau, 1971; Golden and Birns, 1968; Lesser, Fifer, and Clark, 1965; Heber, Garber,

Harrington, Hoffman, and Falendar, Note 2). Low social class status, or poverty level income, and maternal IQ of less than 80 are two key factors that have consistently been associated with cultural-familial retardation. Among some of the psychological factors which have been cited as important, as summarized by Ramey, Stein, and Campbell (1976), are the following: (1) low level of achievement motivation of the family and subculture, (2) maladaptive family goals for children, (3) low quality of the language environment, (4) inaccessibility of adults to reinforce new behavior patterns, and (5) unavailability of preventive or remedial instruction.

Since approximately 80% of persons who are identified as mentally retarded at some point in their lives meet the cultural-familial criteria, early stimulation programs were initiated in order to prevent decline in intellectual growth that could be attributed to environments that fail to support development adequately (Haskins, Finkelstein, and Stedman, 1978). Hence, based on those variables of the infant and his/her family which had been shown to be empirically related, in the statistical sense, to variables associated with cultural-familial retardation, the concept "at risk" evolved (Haskins et al., 1978). Early interventionists have attempted to predict which children are most likely to fail in the public schools and can consequently identify children who are "at risk" for developmental retardation.

The Carolina Abecedarian Project, at the Frank Porter Graham Child Development Center, which was begun in 1972, is an example of a project which constructed a predictive index, called the "High Risk Index", in order to identify infants for inclusion in a high risk intervention project (Ramey et al., 1976). This index includes those environmental factors which would best predict later school failure. These factors include maternal and paternal education, occupation and income, sibling and maternal IQ, sibling achievement, and absence of the father from the home, as well as others.

Although these factors have been found to be associated with cultural-familial retardation, the relative contribution of these factors has not been systematically evaluated (Ramey et al., 1976). Furthermore, empirical attempts to identify factors related to mother-child interactions, maternal child-rearing practices, language interaction and other specific processes of a mother and her infant in their environment may be more important than the more nebulous poverty explanation of etiology.

Cognitive Development and Social Class Differences

Interest in the relationship between social class status and intellectual development has resulted in a proliferation of studies with "high risk" children. Since a relationship between social class status and intellectual

status had been established at the school-age years (Freeberg & Payne, 1967; Jones, 1954; and Mercer, 1974), subsequent investigations sought to determine whether or not this relationship existed prior to school entry. The studies addressing this issue can be summarized as representing two main points: (1) a child's early socioeconomic status can affect later intellectual development; and (2) the effects of socioeconomic status are moderated or lessened and appear to be less evident in children who have attended early day care intervention. These studies will be reviewed below.

As outlined previously, the literature, in general, has defined high risk children as children at risk for developmental retardation based on the social class criterion and other related predictive indices. Several studies sought to establish a statistical relationship between the child's early social status and later development. Willerman, Broman, and Fiedler (1970) assessed the relationship of infants' Bayley Scales of Mental and Motor Development test scores at 8 months to four-year Binet IQ's as a function of social class status. Among 8-month-old retarded infants (lowest quartile on Mental and Motor tests), those who came from the lowest social class were seven times more likely to obtain IQ scores below 80 at age 4 than if they came from higher social class homes. Ireton, Thwing, and Gravem (1970) examined the relationship of infant mental development to 4-year Binet IQ

scores as well as socioeconomic status. The results showed that socioeconomic status is a better predictor of IQ at age four than either early mental test scores or neurological scores.

Another approach to the issue of social class status as it relates to intellectual development is the direct comparison of the intellectual status of low socioeconomic status children to that of middle class children. Several studies provide consistent results. Golden, Birns, Bridger and Moss (1971) found highly significant IQ differences at three years of age between middle class and lower class children, as identified by parental occupation and welfare status. Heber, Dever and Conry (1968) found that there was a steady decline in IQ during the first 168 months of life in children whose mothers had IQ's below 80; as compared with children who showed no such decline and whose mother's IQ's were above 80. Others have demonstrated an intellectual decline in high risk children between the ages of 18-36 months (Bayley, 1965; Campbell and Ramey, Note 3).

The second major point related to the effects of social class status on intellectual development evolves from early intervention studies that have demonstrated positive short-term effects of intervention on cognitive development. The efficacy of early intervention has been extensively reviewed elsewhere (Bronfenbrenner, 1975; Haskins et al., 1978).

Two types of intervention programs emerged during the 1960's (Haskins et al., 1978). These consisted of either day care or preschool programming outside the child's home, or home stimulation programs that involved working with the mother and the child (Gray and Klaus, 1965; Karnes, Teska, Hodgins and Badger, 1970; Levinstein and Sunley, 1968; Schaefer, 1972; Weikert, Deloria, Lawser and Wiegerink, 1970). Children were placed in the program two to three years before entering public schools. Although philosophy and method varied from project to project, the focus of the curricula was on cognitive objectives. Standardized intelligence measures were a primary source for evaluating program effectiveness.

Two general results emerged from these early programs (Ramey and Haskins, Note 4). First, economically disadvantaged children exhibited IQ's that were 8-10 points higher than controls after a year or two of preschool education. Secondly, these positive effects no longer appear after a year or two in the public schools for either IQ scores or achievement tests. Thus, intervention programs could make an initial impact on the young child's cognitive growth, but more was needed to sustain it.

As a result of the positive, but short term effects on IQ scores provided by 2-3 year intervention programs, longitudinal high risk intervention programs were initiated to begin intervention at an earlier age and inhibit the intellectual decline in IQ. These programs were more

intense and provide valuable information and suggestive data on cognitive, language and social development as it relates to socioeconomic status. Two programs in particular, the Milwaukee Project and the Carolina Abecedarian Project, maintained a comprehensive, ecological approach to early intervention (Haskins et al., 1978). Both projects enrolled economically disadvantaged, high risk infants "within the first half-year of life, included a control group, documented their center-based intervention, kept standardized test data, and published their results" (Ramey and Haskins, Note 4, p. 3).

The Milwaukee Project (Heber et al., Note 2) resulted in intelligence test differences between experimental and comparison children that began to appear as early as 14 months of age. This divergence in IQs continued up to seven years of age, averaging about 20 IQ points.

The Carolina Abecedarian Project at the Frank Porter Graham Child Development Center at the University of North Carolina (Campbell and Ramey, Note 3) provides the second example of a longitudinal project systematically documenting the measured decline in intelligence in high risk children. The Abecedarian Project consists of high risk, lower socioeconomic status infants who are identified and randomly assigned to either the experimental day care intervention group or to the non-intervention control group. The random assignment of infants to the experimental groups represents a unique feature of this design when compared

to previous early intervention projects. The infants and their families were selected for inclusion into the longitudinal project before the birth of the infant by use of a high risk index, which includes parental income, parental education and maternal IQ.

Using the Bayley Scales of Infant Development, Mental Development Index (MDI) (Bayley, 1969) as the primary assessment measure prior to 24 months of age, the Abecedarian investigators found a significant difference in MDI scores at 18 months of age. That is, prior to 18 months the experimental and control infants did not differ. At the 18 month testing period, however, the control group, those receiving no systematic day care at the Center, showed sharp declines in their tested mental development. On the other hand, the experimental group remained stable. This trend continued at 24 to 36 months, using the Stanford-Binet Intelligence Scale (Terman and Merrill, 1973). These two assessment points represent the first real and maintained divergence between the experimental and control groups. However, the difference between the experimental and control groups was never as large as that from the Milwaukee project.

Summary. The literature reviewed above on the cognitive development of lower socioeconomic class children reveals one significant finding. The differences in measured intelligence between infants in middle and low

social class groups begin to emerge around the age of 18-24 months. Systematic early intervention programs can prevent or retard the intellectual decline of low social class children. However, standardized intelligence tests yielding IQ scores were the primary, if not the only source of data for evaluating the effectiveness of intervention. Most of the early studies provided only general clues as to what processes of development may be influencing these findings. Because the differences in intelligence appear to develop during the time that infants are beginning to learn to talk, there is currently speculation that these changes result from the infant's experience during the period of language acquisition (Streissguth and Bee, 1972).

Language Development and Social Class Differences

Studies focusing on the use of language and the processes affecting its development have generally been concerned with either describing normal language acquisition or comparing the use of language between normal and deviant learners, particularly language delayed or mentally handicapped children (Bloom and Lahey, 1978; Menyuk, Note 5). There has been very little effort toward understanding the acquisition of language by children from different social class groups. One finds a preoccupation with maternal language and usage as it affects the disadvantaged child (Bee, Van Egeren, Streissguth, Nyman and Leckie, 1969; Hess and

Shipman, 1968; Kilbride, Johnson and Streissbuth, 1977).

In addition to the scarcity of research with children from lower socioeconomic groups, the studies that do exist have focused on the linguistic competence of the children after the onset of syntax (Bloom, 1975). The use of standardized assessment measures which yield a unitary discrete score with which to describe or compare the children's language is the popular method for investigation. Since this method of investigation assesses such skills as vocabulary, object identification and sentence syntax, it focuses on children who are generally three years and older, relying on verbal language acquisition.

Two studies which are of particular interest here were generated from longitudinal, early intervention projects. The Milwaukee Project (Heber et al., Note 2), mentioned earlier, compared the performance of an experimental and control group of high risk, disadvantaged children, using free speech samples, a sentence-repetition test, a grammatical comprehension test, a test of morphology, and the Illinois Test of Psycholinguistic Abilities (Garber, Note 1). The free speech samples were collected beginning at 20 months of age, with morphemes per utterance and number of vocabulary words the variables of concern. Heber et al. (Note 2) reported that the period of language growth between 18 to 30 months was a critical period of development for the experimental group. At 20 months of age the experimental group was using almost 50 percent longer

utterances than the controls and consistently more vocabulary words. Across all the linguistic measures of analyses used at varying age levels, the experimental group performed consistently better than the controls, although more variability existed with these measures than with the measures of IQ performance.

In summarizing their data on linguistic development, Heber et al. (Note 2) attributed the difference in measured performance between their experimental and control groups to "a concomitant of varied early experience" (p. 86), due to the early intervention project. They, therefore, were able to show not only differences in IQ levels but also differences in language development at 20 months of age.

The Carolina Abecedarian Project (Campbell and Ramey, Note 3) also attempted to assess the effects of intervention on language development. Gordon and Feagans (1977) used standard psycholinguistic measures to compare the development of language between the high risk group of children receiving day care intervention and those high risk infants receiving no day care intervention. At 3½ years of age the experimental children performed significantly better than the control on the psycholinguistic measures.

In addition to the use of formal language assessment measures on their children past the age of three, the Abecedarian investigators have attempted to characterize the linguistic environment of the very young infant (Ramey and Mills, Note 6). Using a mother-child interaction

observation method, Ramey and Mills looked at infant and maternal vocalizations, among other behaviors. They found that the high risk home-reared infants at 3-9 months of age had fewer vocalizations occurring simultaneously with the mother's vocalizations than the high-risk group receiving day care. In addition, the high risk experimental group vocalized more frequently during the session than the control group, approximating more closely the frequency of vocalizations from a general population sample.

This finding is consistent with other mother-child interaction studies looking at social class differences that have characterized infant vocalizations and maternal behaviors with their infants. Kilbride, Johnson and Streissguth (1977), for instance, reported that professional-class mothers talked more to their 2-week old babies than working-class mothers. Tulkin and Kagan (Note 7) looked at the social class differences of 10 month old infants with their mothers. As with the Kilbride et al. (1977) study, Tulkin and Kagan found the primary differences between the two groups to be in the area of maternal vocalizations. "The professional-class mothers talked more to their babies, both spontaneously and in response to their infants' vocalizations, gave more verbal imitations, and engaged in more face-to-face verbalizations" (Streissguth and Bee, 1972, p. 170).

Although Lewis and Wilson (Note 8) found no social class differences in the amount of vocalizations by mothers

to their infants, significant differences were found in the amount of infant vocalizations to their mothers, favoring the lower-class infants, however. This presents a direct contradiction to other studies, suggesting the need for further research.

Summary. In summarizing the literature concerned with language development and social class differences, several factors emerge. First of all, it is even more apparent when one reviews the scarcity of empirical studies with young children from high risk populations and their early language development, that studies of early language performance have been relegated to a secondary position in relationship to the over-powering focus on intelligence and IQ. The major variable for comparing and describing lower socioeconomic class children with middle class children in early intervention studies has been the standardized, discrete IQ score.

Secondly, it becomes evident that at the period in which a significant divergence in IQ scores begins to evolve, between 18 to 24 months, one finds few, if any, studies on language and early communications. The investigations have concentrated their efforts at either the very early infant vocalization stage (1-12 months) or at the onset of syntax (after 24 months). When one considers the methodological strategies involved in the study of early language and communications of high risk children, it appears very limited. That is, either traditional, stand-

ardized tests are used, resulting in discrete scores, or simple frequency counts of infant vocalizations are obtained from mother-child interaction studies.

Since it appears that a crucial period for developing language and communications may be between 18-24 months, and that this period of development may differentiate subgroups of the social class strata, providing information for treatment programs, investigations in the area of early communications are pertinent. Between the ages of 12-24 months infants learn to communicate within their social context as they acquire a lexicon (linguistic symbols). Recent studies in the area of early pragmatics and communications with normal infants can provide valuable information and guidance for research efforts.

Early Language and Communications Development

The past decade of research on language development provides evidence of a refocusing of attention by psycholinguists from the syntactic and semantic components of language to pragmatics. Pragmatics can be defined as the relations between linguistic signs and their human users (Morris, 1946 in Bates, 1976); that is, for purposes of this study, how children use early language within a social context.

Interest in the development of pragmatics in young children has led scientists to consider early prerequisites

to such traditional concepts of language as word acquisition and syntax. For example, it is now recognized that the use of nonverbal gestures by the young infant may have particular significance in language development by contributing to the learning of the use of signs, both verbal and nonverbal, to communicate. A variety of nonverbal behaviors have been identified as potentially significant prerequisites to communications and language. Because of an interest in the preverbal behaviors of young infants (before the onset of syntax at about 20-24 months), many recent studies have attempted to explain prelinguistic behaviors in terms of either: (1) cognitive prerequisites, or (2) social development.

The following review of the literature (much of it, as yet, theoretical) concerned with the development of pragmatics in young children will focus on three bodies of information. First, there is the body of literature which attempts to describe and explain early prelinguistic behaviors in young children from a psycholinguistic perspective, with the introduction of the "speech-act" theory of J. L. Austin (1962), and dominated by Elizabeth Bates (1976). Secondly, a review of recent studies attempting to identify a relationship between early cognitive behaviors, based on the sensorimotor stages of Piaget (1952), and language development will be presented. Thirdly, those studies focusing on the nonlinguistic factors associated with social development and their relationship as prerequisites to

language will be reviewed. All of the following literature has dealt almost exclusively with normal children. A few studies with disadvantaged or handicapped children are beginning to surface and will be included where appropriate.

Pragmatics from a Linguistic Perspective

"The notion of pragmatics stresses the creative role of the speaker in using language to communicate an intended meaning" (Snyder, 1976, p. 12). Based on the speech-act theory of J. L. Austin (1962) as a framework for research on the development of early pragmatics, Bates, Camaioni, and Volterra (1975) investigated the behavior of infants related to the onset and development of intentional communications. The resulting developmental communications hierarchy Bates et al. delineated evolved out of the three types of speech acts postulated by Austin, which occur whenever someone speaks, and are the following: locutionary, illocutionary and perlocutionary. Locutionary acts would involve those acts, or behaviors, required for making speech, e.g., uttering sounds. In the more traditional sense, for example, one might focus on an individual's articulation and syntax when describing his locutionary acts. Hence, in order to perform a locutionary act, one must have in their repertoire the onset of speech (Bates, 1976). An illocutionary act would be considered as the conventional social act that takes place between a speaker

and listener. The illocutionary act carries with it the force of communicative intent, e.g., to urge, question, advise, order, state (Searle, 1965). Therefore, although verbal speech is not required in order to perform an illocutionary speech act, one must be able to use a conventional signal with the intention of carrying out a socially recognized function. The conventional signal could be a nonverbal gesture, such as pointing to show an object. The third type of speech act is the perlocutionary act, which is that component of the speech act in which the signal creates an effect on the listener, but may be either intentional or unintentional. Bates (1976) has used the example of a newborn's cries as resulting in the unintentional effect of the mother feeding the infant.

By identifying the three components of the speech act as discussed above, Bates et al. (1975) were led to the recognition that a communication act, illocutionary act, could take place prior to the onset of speech. Any conventional signal, such as pointing, that communicated an idea to the listener and affected the listener's behavior, could be considered a type of communicative act.

The focus on the pragmatics of language, communicative acts in a social context, led many researchers to begin investigating the early communicative behaviors of infants prior to speech. Several studies provide evidence of the use of intentional behaviors to communicate by young infants. Snyder (1976) provides a thorough review

of the literature related to early communicative development.

Dore (1974) conducted a study of the pragmatics of early child language by observing the illocutionary speech acts of two infants, 15 months of age. The infants were videotaped in 30-45 minute sessions every two weeks until they began spontaneously to produce two words within a single utterance. Transcriptions were made of four types of behavioral evidence: (1) the child's utterance (vocalization or word); (2) his nonlinguistic behavior, e.g., gestures, eye contact, facial expressions; (3) the adult's response, both verbal and nonverbal; and (4) the relevant, salient apsects of the context of the utterance. Dore identified eight types of "primitive speech acts." These were labeling, repeating, answering, requesting (action), requesting (answer), calling, greeting, protesting, and practicing. Based on this and other studies, Dore concluded that the development of speech acts during the one-word stage may positively affect the child's later acquisition of syntactic and semantic structures.

A study conducted by Carter (1979) used a highly specific coding procedure for studying the distinct period of pre-syntactic communicative development consisting of the co-occurrence of gestures with vocalizations. Carter's position varied from that of Dore's in that she differentiated the communicative act (gestures with vocalizations) from the speech act (those containing illocutionary force),

although she noted that at the early stages of development the illocutionary force and the predication were inseparable. Carter used parameters of the communicative act and event that were similar to that used by others to study the behaviors of one child during his second year of life. The child behaviors observed and recorded in Carter's study included a transcription of the utterance, the gestural concomitant, the configuration of the gesture itself, the inferred listener, the location of the child and of the gestural object or entity, the temporal relationship between the gesture and the morpheme, the direction or location of the infant's regard, and delineation of the act using specific communicative schemas. An interjudge reliability of 93% was obtained for the coding categories.

Carter observed eight different sets of gestures and co-occurring vocalizations which were used to express particular communicative intentions. She identified these as "communicative schemas." The basic schemas were the request attention schema, which was subdivided into the attention to self and the attention to the object, and the pleasure-surprise-recognition schema. Carter concluded that the co-occurrence of gesture and vocalization represents the infant's first autonomous communicative system.

Antinucci and Parisi (cited in Bates, 1976) used a generative semantic model to describe the very early communicative functions used by 15-19 month old Italian children. Although their analysis engages a more linguistic

approach than is necessary for the discussion here, the summary of their findings is relevant. Antinucci and Parisi concluded that the "speech acts" of commanding, declaring, and negating are all performed with the first one-word utterances of their subjects.

Bates, Camaioni and Volterra (1975) chose to study the development of performatives (the intentional function or illocutionary component of the infant's act) prior to speech itself by inferring the intention to communicate from its early manifestations in gesture, eye-contact, and prelinguistic vocalizations. In particular, they were concerned with two functions, the imperative (to request) and the declarative (to show). Bates et al. used a "quasi-longitudinal model . . . in which several children at strategic ages or developmental stages are followed until they overlap one another in development" (p. 210). By following three subjects longitudinally, they were able to identify stages in the development of communicative intentions. Based on the speech theory of Austin (1962), they described intentional communications in the form of illocutions as emerging around 10 months of age. Prior to that, they interpreted the behaviors of the infants as perlocutionary acts; that is, the infants produced <u>unintentional</u> effects upon the listener.

Bates et al. identify two early communicative functions as the "protoimperative", the use of the adult as a means to attaining objects or other goals (as in making a

a request) and the "protodeclarative", the preverbal effort to direct the adult's attention to some event or object (as if to "show"). They found distinct stages of development related to each of these two functions. In the first, the protoimperative, the infants move through the following developmental sequence:

(1) Wants object--infant either obtains object himself, or doesn't get it (unable to use the adult as a means for obtaining his goal).

(2) Wants object--fusses while trying to obtain it himself, vocalizes and/or points to object.

(3) Wants object--points to and/or reaches for the object, then looks at the adult.

(4) Wants object--uses a ritualized signal or vocalization to obtain the adult's attention and then indicates the intention of a request for help.

(5) Wants object--uses a linguistic symbol to signal help.

In the development of the protodeclarative (showing function), the following sequence of development was identified (as described by Snyder, 1976, 1978):

(1) Tries to obtain adult attention--uses direct manipulation and physical contact (grasp, approach, reach, etc.) to get adult's attention.

(2) Tries to obtain adult attention--uses "showing off" or exhibitional behavior in order to get

the adult to smile, laugh, watch, attend in some fashion.

(3) Tries to obtain adult attention--uses mutually shared attention by introducing an object as focus of attention, e.g., points, shows, or gives the object to the mother.

(4) Tries to obtain adult attention--uses a ritualized signal, like pointing and vocalizing, to get the adult to attend to an object.

(5) Tries to obtain adult attention--uses a linguistic symbol to interact with adult.

Bates et al. attempted to examine the dynamic nature of the young infant's early communicative acts. This was accomplished by analyzing the videotapes of three young infants (ranging in age from 2 to 12 months at the beginning of the study), and describing the infants' utterances, nonverbal communicative behaviors (eye contact, gestures, pointing), and the situational context, and formulating a theory of early communicative development. The results of Bates et al. were consistent with the findings of the studies cited above; that is, infants communicated prior to the onset of speech, and their communicative abilities followed a developmental sequence. (The interpretation of their findings as it relates to cognitive development will be discussed in the next section.)

In a correlational study with a larger group of infants (N = 25), Bates, Benigni, Bretherton, Camaioni, and

Volterra (1979) found a relationship between preverbal gesturing and vocalizing and the subsequent onset of language. That is, for those children who utilized ritual signaling, e.g., pointing, giving, showing, at an earlier age and with more frequency, Bates et al. found them more advanced weeks later in the early stages of language comprehension and production. This evidence would lend support to the developmental notion of communicative acts.

Snyder (1976) conducted a study based on the developmental progression of the use of communication identified by Bates and others. Snyder compared the use of intentional communications by two groups of infants who were matched for mean length of utterance (MLU) and socioeconomic status. The two groups of 30 infants consisted of a normal and a language-delayed group (average age = 24 months). Two experimental tasks, consisting of 10 items each, were devised which attempted to maximize the communicative situation so that the infant would "request" or "show". The infants' communicative attempts were rated on a 5 point scale, which consisted of behaviors ordered in terms of complexity and based on the progressive developmental levels, as delineated by Bates et al. (1975).

The task that Snyder used was devised to assess the two functions of communications that Bates had identified, the declarative and imperative response, and which have been identified by others as the first to emerge (Halliday, 1975; Greenfield and Smith, 1976). For the declarative

response, Snyder looked at the child's attempts to interact and communicate by showing and giving objects to the adult in an informal, social context.

With the imperative response, also known as the request/command function, Snyder assessed how the child communicated to the adult that s/he wanted something and needed the adult's assistance in order to obtain it; for example, by placing the child on a high chair with a plate of cookies in his/her sight, but out of reach.

Snyder found that the two groups could be differentiated along the dimension of communicative abilities. This was a significant finding because the two samples of children in this study were matched for expressive language level using a more traditional measure (mean length of utterance), which placed both groups of children at the one-word stage of language acquisition. Snyder found significant differences between the groups in terms of their ability to use language to communicate. The language disabled children less often used linguistic symbols and vocalizations, which are higher level behaviors, in their communicative attempts.

A review of recent literature reveals that young infants can and do intentionally communicate prior to the onset of speech by involving the use of behaviors such as prelinguistic vocalizations, gestures, eye contact, and giving. These communicative acts serve specific intentional functions for the infant. Although the theoretical

orientation and interpretation of these early communicative behaviors may differ across investigations, their existence is unmistakable. For a discussion of the early communicative functions as identified by other authors see Halliday (1975), Greenfield and Smith (1976), and Gruber (1973).

Summary. The literature related to the development of early pragmatics is best summarized by Snyder (1976) as the following:

> (1) All the research concerned with the infant's developing pragmatic abilities demonstrate that these abilities begin to emerge long before the infant has acquired speech.
>
> (2) All of the studies reveal the infant's success at communication in the face of limited linguistic performance. (p. 75)

Snyder's study lends support to the notion of communicative development and its potential as an early measure for differentiating between groups of infants, some of whom may be experiencing difficulty developing language and communicative behaviors.

Cognition and Its Relationship to Early Language and Communication

Perhaps as a reaction to the nativists' notion of an autonomous "language acquisition device" (McNeill, 1966), investigators concerned with language development began concentrating on the prerequisites to language, in particular, that of cognition (Bates, 1979). Piaget's theory of

cognitive development, with its well-defined sensorimotor stages during infancy, seemed to lend itself to the greatest amount of research and controversy in this area.

Hermine Sinclair-de Zwart at the University of Geneva was the psychologist in the early 1970's to explicate the Piagetian cognitive position in relationship to language development (Sinclair, 1971). The basic position of a Piagetian-oriented psychologist towards language acquisition is explained by Sinclair-de Zwart as including the following propositions:

> (a) that the infant brings to his language acquisition tasks not a set of innate linguistic universals, but innate cognitive functions which will ultimately result in universal structures of thought;
>
> (b) that linguistic universals exist precisely because of the universal thought structures--and these are universal, not because they are inborn but because they are the necessary outcome of auto-regulatory factors and equilibration processes;
>
> (c) that since intelligence exists phylogenetically and ontogenetically before language, and since the acquisition of linguistic structures is a cognitive activity, cognitive structures should be used to explain language acquisition rather than vice versa. (p. 123).

The basic question, then, that scientists began to ask was what the cognitive acquisitions of the infant are before his first phonetic sound combination. Sinclair-de Zwart defined language proper as beginning when a fair proportion of the child's utterances can be interpreted meaningfully, at around 15-18 months. Earlier communication by the infant was viewed as an expression of the infant's affective

states that are linked to the outcome of his acts, e.g., stress, melody, intensity, and duration. According to Sinclair-de Zwart the onset of language occurs when the first semiotic function appears (that is, the ability to represent reality mentally); either as a motor-symbolizer (a representation of an act by a movement which is not part of the act--opening your mouth to represent opening the door), or in symbolic play.

Piaget has stated that two structural elements underlie the achievements of the sensorimotor period (Sinclair, 1971):

(a) spatial displacements: The ability to come and go in the environment with the realization that you can reach the same point by different paths.

(b) object permanence: The realization that objects do not cease to exist when they disappear from the visual field.

With the attainment of these basic cognitive structures, in the Piagetian view, the semiotic function of language emerges. It is perceived that at this point in the infant's development language begins to play the role of a representational symbol system. The infant learns to use language to express his reality and needs, both social and cognitive.

Sinclair-de Zwart (1973) has argued in favor of the

notion of cognitive functions as prerequisites to language acquisition. Language acquisition, however, is viewed as the onset of syntax at about 18 months, with earlier communicative behaviors viewed as expressions of social-emotional development.

A different application of Piaget's theory is currently being applied by several investigators by examining the development of language from an epigenetic approach. (Bates, 1979; Moerk, 1975; Siebert, Note 9). This approach is based on a causal-genetic explanation of language development, which considers both the contributions of the environment as well as genetic factors, as opposed to the nature vs. nurture dichotomy debated in the 1960's (Bates, 1979).

Moerk (1975) discussed the basic principles in Piaget's system which he considers relevant for language development. Two of these principles are summarized below:

(1) Epigenetic principle: "In short no structure is ever radically new, but each one is limited to generalizing this and that form of action abstracted from the preceding one" (Flavell, 1963, p. 83; in Moerk, 1975, p. 152).

It is therefore possible to find antecedents for linguistic structures. Piaget was describing the development of cognitive operations, but others have applied this principle as a basis of language acquisition (Braine, 1971; Jenkins and Palermo, 1964; Werner and Kaplan, 1963).

According to Moerk (1975), Piaget's approach makes it possible to trace the evolution of sentence structures from nonverbal behavioral and meaningful foundations (p. 153). In other words, syntactical structures (such as subject-verb-object) can be viewed as being derived directly from or identically with cognitive structures.

(2) Horizontal and vertical décalage: "The concept of décalage refers to the fact that functions or structures are not immediately applied to all tasks (i.e., horizontal décalage) or that formally similar structures emerge at varying levels of development (i.e., vertical décalage)" (p. 153).

When applied to the development of language, the concept of décalage would seem to support the notion of the symbolic function appearing first in preverbal behavior and later in verbal behavior. Moerk has urged psycholinguists to investigate not only the structural components of linguistics, but the functional aspects of language acquisition and language behavior, as well.

Bates (1979) has expounded a similar view of language acquisition, utilizing the Piagetian ontogenetic and phylogenetic model, with recent data to support it. Similarities between Piagetian age norms for certain cognitive developments and normative data on the onset of language led several investigators to explore this relationship in terms of cognitive prerequisites. Bates has

identified three possible explanations for these similarities, which suggest the need for different kinds of data to support any one view.

One explanation, according to Bates, for observed similarities in the cognitive and language behaviors of infants (such as object permanence and naming), is the notion of homology through direct causation. In order to verify this, one must demonstrate sequencing; for instance, one would want to show that object permanence always precedes naming. In addition, one would have to show evidence of a strong correlation between object permanence and naming, as well as the efficacy of training in object permanence to promote language development.

A second explanation one might choose to support is the notion of homology through shared origins, or "software," as Bates describes it. For this position, the researcher would have to show strong positive correlations between the cognitive and language skills, but not necessarily sequencing. Training would affect an underlying base structure, but not necessarily one skill domain over the other.

The third reason for the similarities between cognitive and language skills may be simply an analogy through common task constraints. We may identify similarities in behaviors, but it may be due to the fact that the associated tasks require similar, yet independent structural solutions. Hence, the relationship does not lie within the

child, but exists within the tasks we are asking him to do.

Bates (1979) supports the second position. "Our own position on cognitive prerequisites to symbolic communication is the second: homology through shared underlying 'software.' This model predicts correlation but not sequencing" (p. 138). In a study conducted by Bates et al. (1975) preliminary evidence was obtained to support this position.

In a longitudinal study, Bates et al. (1975) observed the behavior of three infants from videotapes, coding the prelinguistic, communicative behaviors. In addition, the Uzgiris and Hunt Ordinal Scales of Psychological Development in Infancy (1975) were administered regularly to determine the level of cognitive development attained. Bates et al. found that illocutionary communication acts, the intentional use of the prelinguistic protoimperatives and protodeclaratives, emerged at the same time the cognitive behaviors related to Sensorimotor Stage 5 were observed. In particular, the cognitive developments of cause/effect and means/end relations in nonsocial sequences were related to the communicative development of person-to-object (the protoimperative or requesting) and object-to-person (the protodeclarative or showing) sequences. Piaget's Sensorimotor Stage 5 represents the onset of "tertiary circular reactions" or the invention of novel means to familiar ends.

In a larger sample of 25 infants, Bates et al. (1979) "found significant correlations between object-to-object tool use at 9 to 10 months of age and various aspects of communicative development from 9 months onward" (Bates, 1979, p. 142).

In terms of the development of cognitive behaviors typical of Piaget's Sensorimotor Stage 6, Bates et al. (1975) found gestural and vocal naming developing during Stage 6 with their sample of three infants. This stage marks the beginning of mental representation and the ability to represent or imagine hidden causal sequences and absent objects. However, only a subset of Stage 6 behaviors were found to be correlated with the vocal and gestural naming abilities. The three Uzgiris and Hunt scales representing those behaviors found to correlate with the commnicative behaviors were imitation, means/end relations, and schemes for relating to objects. Two cognitive scales that were found not to be significantly related to the infants' naming behaviors were object permanence and spatial relationships.

Other investigators have recently tried to determine the relationship between Piaget's Sensorimotor Stage cognitive developments and various aspects of communicative development. In a study conducted by Harding and Golinkoff (1979) the onset of the use of prelinguistic vocalizations by young infants (average age = 10.7 months) was related to the infants' causal cognitive development. Forty-six

infants were classified as being in either Stage 4, Stage 5, or as transitional, based on the Uzgiris and Hunt Object Permanence Scale (1975) and a causality task that was developed and based on Piaget's research. The investigators conducted four short (2 minutes) "episodes" between the mother and infant which consisted of situations attempting to elicit an intentional communicative vocalization. An intentional communication was coded if the infant made eye contact with the mother while vocalizing.

Harding and Golinkoff report significant correlations between the occurrence of intentional vocalizations and the infant's level of causal development. That is, only infants in causality Stage 5 used intentional vocalizations, while no Stage 4 infants used them. These findings supported the authors' hypothesis that Stage 5 causal development may be necessary for the intentional use of vocalizations. However, they caution that the interpretation may be unsound due to the particular causality task they developed and used. That is, their task may have misplaced the infants into the wrong stage of development.

In regard to the object permanence tasks, Harding and Golinkoff found the level of communicative development to be statistically related to performance on the tasks, indicating an interrelationship among some cognitive achievements and the use of intentional vocalizations. However, the results failed to show only Stage 5 infants using intentional vocalizations. On the contrary, 31%

of the infants in Stage 4 were using intentional vocalizations, while 36% of the infants placed at Stage 5 were not using intentional vocalizations. The authors suggest that an alternative interpretation to the cognitive basis for communicative abilities may be necessary. They suggest that the infant's ability to use intentional communications may depend on the individual differences in the style of mother-infant interaction, which they are currently investigating.

A study by Corrigan (1978) looked at the relationship between language and object permanence with 3 infants. She, too, failed to find a relationship between the two measures, although the onset time for gestural and vocal naming were similar to that of Stage 6 cognitive behaviors.

In the Snyder (1976) study mentioned earlier, an analysis of the infant's level of communicative behaviors and their levels of sensorimotor intelligence was also conducted. In a multiple regression analysis, Snyder found that most of the variance among the infants' declarative or "showing" scores and the imperative "requesting" scores could be accounted for by the Development of Means for Obtaining Desired Environmental Events scale of the Uzgiris-Hunt Ordinal Scales. Although six scales were administered to the infants, only the behaviors represented by this one scale significantly predicted the infant's proficiency in communicating. Snyder did not find that the linear combination of all scales was

necessary in order to estimate the infants' communicative scores. Snyder does report, however, that Stage 6 object permanence and imitational ability did seem to be present for those infants communicating by use of linguistic symbols (hence, mental representation). However, whether or not there is a sequencing effect to the development of cognitive and language abilities cannot be determined from Snyder's study.

Kahn (1975) has done similar investigations with profoundly retarded children. He was interested in determining whether or not all children in his sample who were using expressive language were also at least at Stage 6 of Piaget's sensorimotor period. Eight children ranging in age from 53 to 98 months, who had expressive vocabularies of at least ten words, and eight children (CA = 47 to 92 months) with no expressive language were tested using the Uzgiris and Hunt Ordinal Scales. The results indicated that all the children exhibiting meaningful language were at Stage 6 in at least 2 out of 4 of the subtests used representing Piaget's sensorimotor period. Kahn's results with handicapped children are inconsistent with those reported by Bates et al. (1975) and Snyder (1976) for normal and language delayed populations, in that Kahn's expressive language group did not consistently display behaviors representing Stage 6 development of means for achieving environmental events. One of the subjects using expressive vocabulary was functioning at Stage 5 on the

means/end scale. However, none of the non-language group demonstrated Stage 6 functioning on all of the four subtests used. Kahn summarizes his data to support the notion of the need for cognitive prerequisites, specifically that of mental representation as exhibited in Stage 6, prior to training language. (See Kahn, 1979, for his most recent review of the relationship between cognition and language.)

In a study recently reported by Greenwald and Leonard (1979), 20 nonretarded infants functioning at Stage 4 and Stage 5 on the Uzgiris and Hunt Ordinal Scales were compared to 20 Down's Syndrome children at the same developmental levels. A measure of their imperative (requests) and declarative (shows) performative usage was obtained by using the task developed by Snyder (1978). No group differences were found on the mean developmental level of requesting behaviors used. However, the Stage 5 nonretarded children's mean level of performance on the showing task was significantly better than that of the Stage 5 retarded children. Greenwald and Leonard conclude that there was a general correspondence between early communicative development and attainment of sensorimotor skills for 3 of the Uzgiris and Hunt sensorimotor subscales: means-end schemas, causality, and schemes for relating to objects.

Summary. It appears that early investigations on the relationship between cognition and language have resulted in inconsistent findings. All studies have relied on the

Uzgiris and Hunt Ordinal Scales of Psychological Development as the primary assessment tool for determining cognitive functioning. However, few studies assessed the children across all six scales, and the type and number of scales selected varied between studies. Most of the studies used observable behaviors to determine the child's use of communicative acts. The parameters of these behaviors are fairly well consistently reported: Eye contact, gestures, pointing, body orientation, environmental context, vocalizations, and mother's response. However, the manner in which the data is collected is inconsistent since no one device is available for assessment. Indeed, most studies are sketchy on how this data was collected, and reliability of the pragmatic behaviors across studies is dubious.

Although, as suggested by Bates (1979), the relationship between cognition and language must be determined by providing evidence of a correlation between behaviors representing the two domains, many of the studies cited above used very small, inadequate samples. In addition, all of the studies reported above selected samples of children across a chronological age span, thus confounding the results with a wide age variance. The development of our knowledge about pragmatics is still in the acquisition stage.

Socialization and Its Relationship to Early Language and Communication

An understanding of the relationship between early language and communications and social development has not been as rigorously pursued as the controversial cognition-language relationship. Some empirical evidence exists, however, to support the notion of the influence of social interactions on the development of language.

Bruner (1975) states that the child's development of language, particularly grammatical structures, is affected by his/her interactions with the mother within a social context. Language becomes a tool or instrument by which the child regulates the mother's attention, or mutually shared activity. The mother assists in the process of developing joint activity and joint attention by establishing set routines with the infant, such as holding out her hands to indicate she is going to pick the infant up, and at the same time waiting for the infant to move forward before completing the action. These routines provide the infant with systematic intentional behaviors from significant others, focusing on the unique interactions that correspond with people, as opposed to things. Eye contact is established at a very young age, and according to Bruner assists in establishing joint reference between the mother and infant as early as four months of age. Joint reference to objects in the environment will provide the framework for interacting and communicating. The mother, again,

initially instigates this activity by "commenting" about the objects of their joint attention.

The process that leads the child to elaborating linguistic rule structures in communication acts, according to Bruner, is inherent in mutual play between the mother and infant. The set routines of early play activities, like peek-a-boo and rolling a ball back and forth, assist in developing ritualized signaling and sequencing. "There is a crucial point here. It is that play has the effect of drawing the child's attention to communication itself, and to the structure of the acts in which communication is taking place" (p. 10). Bruner feels that the process of the development of communications in the young infant is highly dependent upon the mother's constant interpretations of the infant's intended meanings.

Bruner (1975) conducted a longitudinal pilot study of six infants, starting at 6 months of age. Mothers and infants were observed in a laboratory room arranged like a "homelike" room. The sessions were videotaped. Three situations were simulated. The mothers fed their infants, gave them a bath, and played some game they normally did at home. Bruner was interested in tracing the development of action sequences between mother and infant and how communications entered into it.

Bruner's results indicated that mothers do indeed "standardize" the joint action routines with their infants. Through these consistent routines, the infants developed

standard ways of signaling their intent. The action routine developed from mother as agent of action/infant as recipient, to the infant as agent of action giving the object of their joint attention back to the mother. Bruner's work has contributed to the investigation of early pragmatic development by drawing attention to the mother-infant dyad as a unit of analysis.

Sugarman (1977) focused on the child's social interactions, that is, how the child handled people and objects, in her investigation of how communication develops in the young child. Three infants, four to five months of age, and four infants, eight to nine months of age, were observed for 5 months. Anecdotal records were kept of the infant's linguistic and motor behaviors, as well as "molecular" recordings of mother-infant social interactive behaviors.

In a discussion of several investigations about the child's early communication, Nelson (1978) reviewed Sugarman's study. Nelson summarizes Sugarman's findings as supporting the notion of a social interactional context as a necessary condition for language emergence. That is, the child learns to orient toward people and toward objects independently, before the coordination of person and object orientation takes place within a social interaction.

Adopting an ethological approach to language acquisition, Mahoney (1975) describes an approach to delayed language acquisition which is concerned with the development

of communications within the context of the psychosocial environment. Mahoney adopts the notion that language is fundamentally a communicative act. His approach is one which is similar to and consistent with that of Bruner's, emphasizing the principal mechanism of communications to be that of initiating and sustaining social interaction between a child and his/her surroundings. The ethological approach to language acquisition utilizes "both the response patterns which are used by adults to develop and modify children's communication, as well as the stimulus configurations of children which elicit language nurturing behavior from caretakers" (Mahoney, 1975, p. 140).

Mahoney feels that delayed speech development can be more effectively described within an ethological framework which considers both cognitive factors and the adequacy of the child's social environment, emphasizing, however, the latter. Mahoney delineates implications for language training which focus on the social origins of language.

Cohen and Beckwith (1976) examined the verbal environment provided by the mother to the prelinguistic child. Thirty-six infants were observed in their homes during everyday routines. Some of the maternal language variables observed were total talk, positive comments, criticisms and face-to-face vocalizations. One major finding was that more-educated mothers talked significantly more to their infants than less-educated (10 years of education) mothers. This study suggests that the infants' environment

may be different for varying social class groups. Several other studies are related to the significance of the social environment, particularly maternal verbal behavior, as it relates to language development (Clarke-Stewart, 1973; Nelson, 1978).

Summary. Some evidence exists to support the notion of a relationship between early communicative development and early socialization. Several studies were conducted on very small samples of children, providing a description of the type of social interactions and behaviors that may be related to language development. The importance of the mother in facilitating and promoting the child's language development by providing a certain type and level of verbal input is suggested by other studies. The exact nature of the mother-child social interaction that may be related to or required for language development is not yet known.

Summary and Directions for Research

A review of the current knowledge of the development of infants who have been described as at-risk for developmental delay has indicated that the age at which high risk infants begin to deviate from other infants is around 18 to 24 months of age, which coincides with the onset of the use of single words in language development.

Evidence was provided to support the idea that communication begins in the infancy period (as early as 4 to 9 months). Theoretical explanations of language development revealed an interest in the nonlinguistic factors related to early communications, specifically that of cognition and social development. A review of empirical studies related to the theoretical cognitive postulates were inconclusive. Although the last five years have seen much activity surrounding the use of infants' performance on the Uzgiris-Hunt Ordinal Scales as they relate to measures of early pragmatics, the studies reviewed used a variety of methods for collecting communication data and only selected subscales from the Uzgiris-Hunt Ordinal Scales. Current knowledge of the relationship between socialization and language development is even more incomplete, and hence, inconclusive.

Hypotheses

Two major hypotheses addressed in this study relate to the efficacy of early intervention for promoting the development and use of communicative behaviors.

1. The total frequency of intentional communicative initiations exhibited during a free play interaction session will not differ for a high-risk group of infants experiencing day care intervention and a normally-developing

middle-class group of infants; and both of these groups will exhibit a higher frequency than a high risk group of infants receiving no day care intervention.

2. A high-risk day care group of infants and a normal, middle-class group of infants will not differ on the distribution of their spontaneous communicative initiations across developmentally-based categories, and both groups will exhibit a higher proportion of their communicative behaviors at the highest developmental level (the use of linguistic symbols to communicate), than a high-risk group of infants with no intervention.

In addition, several questions concerned with the nonlinguistic factors related to early language development are posed.

1. What is the relationship between infants' general mental development and the use of the most sophisticated communicative level?

2. What is the relationship between the developmental level of communications and language developmental status as measured by a standardized assessment instrument?

3. What is the relationship between infants' sensorimotor cognitive status and their use of the most sophisticated communicative level?

4. What is the relationship between infants' developmental level of communications and the social interaction behaviors between mothers and infants?

CHAPTER III

METHODS AND PROCEDURES

Sample Overview

The total sample consisted of 40 infants and their mothers representing three groups: two low socioeconomic groups and one middle-class group. Twenty-six infants whose low socioeconomic status placed them at risk for developmental retardation were selected from the Frank Porter Graham Child Development Center Carolina Abecedarian Project (Ramey and Smith, 1977). These infants represented the fourth cohort of a longitudinal study of high-risk infants. They were randomly divided into two groups at birth. The high-risk experimental (HRE) group consisted of 14 mother-infant dyads representing the day care intervention component, and the high-risk control (HRC) group consisted of 12 mother-infant dyads representing a control sample. The third group in this study consisted of 14 mother-infant dyads selected from the county birth records as a normal middle-class comparison (MCC) group. The age of all infants at the time of the study was within one month of their 20-month birthday.

Sample Identification

High Risk Experimental (HRE) and High Risk Control (HRC) Groups

Infants were selected for inclusion in the Carolina Abecedarian Project through the cooperation of the North Carolina Memorial Hospital. Prior to the birth of the infant, the families were identified as potentially eligible and were visited and interviewed. The nature of the Carolina Abecedarian Project was explained to them at that time. Each family who potentially met the criteria for inclusion into the program was interviewed further at the Frank Porter Graham Child Development Center and the mother was tested with either a Wechsler Adult Intelligence Scale or a Wechsler Intelligence Scale for Children. In addition, she provided further demographic information about the family.

Each family then received a rating based on a "High Risk Index" constructed by the Abecedarian investigators (Ramey & Smith, 1977). This index results in the selection of families whose socioeconomic characteristics have been shown to place their children at high-risk for failure in the public schools. The High Risk Index includes such factors as parental education, parental income, maternal IQ, and additional factors related to siblings and family status. Criterion for inclusion in the high risk samples

was a score of $\geq$ 11. (For a detailed description of the High-Risk Index Scale, see Appendix A). After infants were born, each was randomly assigned to either the experimental or control group. For the experimental group the day care program began at 3-4 months of age during the summer and fall of 1977.

Both groups of infants are involved in periodic assessment for which the mothers receive a payment. An additional service provided for both groups is family support social work services. The control group (HRC) receives free diapers and formula for as long as needed. The experimental group (HRE) receives a planned curriculum throughout a seven hour day while attending the day care component provided by the Frank Porter Graham Child Development Center five days per week. The rationale for the day care treatment and description of the curriculum and setting are described elsewhere (Ramey, Holmberg, Sparling & Collier, 1977). The Carolina Curriculum was developed to place additional stress on task orientation and language development (for a description of the curriculum and program see Ramey, Holmberg, Sparling, Collier, 1977; and Sparling, 1974). The teaching-learning situation often occurs in one-to-one interaction. At the time of this study, and from one year of age, the high-risk experimental infants have been involved in a setting that consisted of 14 infants and a teacher-infant ratio of 2 to 7.

Middle Class Comparison (MCC) Group

Fourteen infants and their mothers, representing a middle-class sample, were selected from the Orange and Durham County birth records and were residents of the Chapel Hill-Carrboro community in North Carolina. Forty-seven infants were identified from the county records as age appropriate. Potential mothers were notified about the study by letter, which indicated that we were interested in how children play with toys and with their mothers. In addition, the letter explained that their participation would require two visits to the Frank Porter Graham Child Development Center, that each visit would last approximately 1 to 1½ hours, that they would be paid at the end of the second visit. Subsequent to the letter, a follow-up telephone call was made within a week to further explain the study and request their participation. Of those identified, 25 families could be located and were contacted by telephone. The telephone conversation consisted of a more detailed explanation of the procedure to be used with the infant and mother during their visit to the Frank Porter Graham Center, and reiterated the amount of time required, and the payment that would be provided for their participation. Each mother was told that video and audio taping would be done with their permission. No mother refused permission to tape during the phone call. At this time arrangements were made for the

mothers to bring in their infants, and a time and date were scheduled. Ten mothers subsequently declined to participate. Reasons for not participating included: (a) lack of time (N = 4); (b) older children had already participated in previous studies (N = 3); and (c) inability to keep scheduled appointments (N = 3).

At the time the mothers and their infants were seen at the Frank Porter Graham Center for taping and testing, further information was obtained through a personal interview on parental occupation, parental education, number of siblings, and day care participation. Only middle- and upper-class families, as determined by the two-factor Hollingshead Index of Socioeconomic Status, social class levels 1, 2, and 3 (Note 10), were included in the final sample. Out of the total sample of dyads observed, none was eliminated for failing to meet this criterion. Any infant with an identifiable and diagnosed handicap was excluded from the final sample. One infant with a surgically removed cleft lip was observed and subsequently excluded from this study. Selection continued until 14 infants, matched on age and sex to the HRE group, had been observed and taped at the FPG Center. The final sample of 14 mother-infant dyads represented the normal, middle-class comparison sample used in this study.

Sample Characteristics

All infants were within one month of their 20-month birthday at the time they participated in the study. A summary of selected infant characteristics by group are presented in Table 1. In order to determine if the groups were different on certain subject characteristics, chi-square analyses were performed on the sex and birth order variables.

The sex of the infants and order of birth were not significantly different in the three groups of infants as indicated in Table 1. However, the groups did differ in their racial composition, with the MCC group being made up entirely of white infants and the HRE and HRC groups consisting of all black infants. (Although this was an undesirable racial difference, it reflects the nature of the community from which the sample was drawn.)

Although none of the HRC group received intervention in the FGP day care program, several infants experienced alternative care arrangements. Seven of the HRC infants were cared for at home by their mothers. Three HRC infants were receiving care from another family member, while only one HRC infant was attending a small group, private care home. One HRC infant attended a regular day care center.

Similarly, five of the MCC group were cared for in their homes by their mother. Two MCC infants attended a small group, private care home; two infants stayed with neighborhood friends; while three of the MCC infants were

Table 1

Infant Characteristics by Group

Group	n[a]	Sex		Race		Birth Order	
		Male	Female	Black	White	% First	% Later
High Risk Experimental	14 (13)	9	5	14	0	57%	43%
High Risk Control	12 (11)	5	7	12	0	75%	25%
Middle Class Comparison	14 (14)	9	5	0	14	50%	50%
		$\chi^2 = 1.759$ $p = .42$				$\chi^2 = 1.756$ $p = .42$	

[a]Numbers in parentheses indicate the number of infants for whom data was available and used from the free play interaction condition. Data from all 40 infants was used from the experimental task condition.

cared for by sitters in their own homes; and only two infants attended a regular day care center.

The mean educational levels (and standard deviations) of the mothers for the HRC, HRE, and MCC groups, respectively, were 8.92 (3.09), 10.62 (2.02), and 16.43 (2.68). A breakdown of the maternal occupations at the time of this study may be found in Appendix B. The percentage of infants in each group, HRC, HRE, and MCC, whose fathers were living in the home at the time of this study were 17%, 38%, and 100%, respectively.

Setting

Primary measures were obtained by conducting two separate procedures with the mother-infant dyads. Each infant was observed individually with his/her mother in two standardized laboratory situations. The first situation consisted of a free play interaction between the infant and his/her mother. The second situation consisted of the administration of an experimental task by the experimenter to the infant with the mother present.

The setting for both observational situations was a 10 foot square room at the Frank Porter Graham Child Development Center which was furnished like a living room. The room contained a couch, a chair, a large, yellow "parsons" table as an end table on which were placed a lamp, two magazines for the mother, three children's books, an ash tray and a kleenex box. Along one wall was a small semi-circular table and chair for the infant with a box of

crayons and some paper. The room also had a big, orange semi-circular plastic rocker for the infant to play in. In the middle of the room was a small box of toys. The toys consisted of a doll with a plastic bottle, a 4-piece puzzle, a small tea set, a bag of blocks, and a gradated ring stack. In two corners of the room two video cameras hung from the ceiling. A microphone was placed under the lamp shade and in the center of the room, hanging from the ceiling. The room has two one-way mirrors along the walls.

All of the high-risk infants and their mothers had participated in a previous study in the same living room when the infants were 6 months of age. The mothers and infants in the middle class comparison group were seen in this setting for the first time.

For the second procedure the setting was altered slightly for the administration of the experimental task. The box of toys was removed from the room. The small table and chair for the infant was placed next to the couch and chair. The mother sat in the chair with the infant in front and to the side of her. A small yellow parsons table was placed near the infant's table, but out of reach. A covered box of toys was placed beside the experimenter, who sat directly in front of the infant and small table. The experimenter was a white female. The box of toys for the experimental task contained the following items:

1. Baby doll with plastic bottle
2. Pail of plastic blocks
3. Toy cars with little people
4. Cookie on a napkin
5. Milk and a small glass
6. Toy cars
7. Toy drum with wooden drumsticks
8. Pyrex container filled with assorted toys
9. Big, plastic truck
10. Pyrex container of cookies.

For a complete description of the toys and a diagram of this setting, see Appendix C and Appendix D, respectively.

Procedure

Overview

High risk control infants were accompanied to the FPG Center by their mothers, while the experimental infants were taken from the day care program and joined by their mothers in the observation room. Each mother was interviewed, then observed in a free play interaction with the infant, and an experimental task was administered to the infant. All sessions were recorded by video and audio tape. For the free play interaction session an observational coding scheme was developed to obtain information on the infants' spontaneous use of two distinct functions of communications, the "showing" and the "requesting" function, during the free play interaction session. Secondly, an experimental task was developed and used to obtain additional information

on the infant's use of the "requesting" function of communication behaviors.

Prior to entering the observation room, a research assistant (white female) explained the procedures and obtained information from the mother concerning infant status before coming to FPGCDC, as well as additional demographic information (in the middle class sample only). One research assistant managed the taping equipment.

A second visit was arranged for the MCC groups in order to administer the Bayley Scales of Infant Development (BSID). Since the HRC and HRE groups had previously received this assessment by the FPGCDC examiners, an inter-rater reliability of 90% was established with the examiner for the MCC group prior to their assessments. Standard procedures as outlined in the BSID test manual were followed. A standard testing room at the FPGCDC was used for all infants.

The two procedures to be described below were conducted during the regularly scheduled 20-month observation sessions for the HRE and HRC groups. The middle class comparison group was scheduled similarly.

Observational Free Play

The procedure used for the free play interaction was similar to the one developed at the Frank Porter Graham

Child Development Center (described in Farran & Haskins, 1977; and in Ramey & Mills, Note 6). The mother and infant were met outside the observation room, briefly interviewed, and then escorted to the observation room. A 5-minute warm-up session consisted of settling the mother and infant into the room and explaining to the mother that we were interested in how children play with toys and with their mothers. The mother was instructed to interact with the infant as if she had 20 free minutes at home to do whatever she would like. She could play with the infant, read a magazine, watch or read to the infant. The camera was pointed out to the mother and she was told that the session would be taped. The assistant then left the room. This session lasted for 20 minutes.

Experimental Communication Task

At the end of the 20-minute observation session, a maternal teaching task was conducted for data related to another study and lasted 10 minutes. (This procedure will not be discussed in this paper.) Immediately following this, the infant was given a short break which consisted of getting a drink of water and a cracker. While one assistant accompanied the mother-infant dyad to the water fountain, the experimenter set up the room for the experimental task.

The experimental communication task was based on a task developed by Snyder (1976). The procedure for this task consisted of placing the infant in a position such that s/he would be more likely to request adult assistance in obtaining the stimulus items presented. The infant was placed at the semi-circular table in the small chair. The experimenter presented two "warm-up" stimulus items, one at a time, to the infant in order to develop rapport and establish a "set" with the infant that encouraged his/her interaction with the stimulus materials.

After the warm-up period, ten stimulus items were presented, one at a time, to the infant. The item was placed on a small "parsons" table out of the infant's reach. The experimenter brought the attention of the infant to the item and then responded to any attempt by the infant to communicate the desire for the adult to give her/him the item. (For a detailed description of this task, see Appendix E). Attempts made by the infant to obtain the item through the mother were scored. This session lasted approximately 30-40 minutes.

Dependent Variables

The dependent variables and their measures were obtained by analysis of the video and audio tapes taken during the free play interaction session and the experimental

communication task session.

Free Play Interaction Measures

Prior to the coding of data from the three groups in this study, an observational category coding scheme was developed by using video tapes of 20-month mother-infant interaction sessions of a previous cohort in the Carolina Abecedarian longitudinal project. Spontaneous, intentional communicative attempts by the infant to the mother were defined as those sequences of behavior having elements similar to those described by Bates, Camaioni, and Volterra (1975), and used by Synder (1976)--described below. Each instance of spontaneous, intentional communication was transcribed from video tape and subsequently categorized into one of eight categories. Back-up audio tapes were used when clarity of voice was needed. Maternal behaviors and response to the infant, as well as contextual cues were also transcribed to aid in appropriate categorization of the infant's behavior.

Eight communication categories were used in this study (see Appendix F for a summary of these eight categories). Four of the categories represent the function of communication in which the infant "shows", "points to", or "gives" an object to the mother in order to obtain the mother's attention. Bates (1976) has termed this the "protodeclarative" to the linguistic use of the declarative in speech. This function is referred to as the "showing function" in this study.

Consistent with the developmental progression of the

"showing function" of communications described by Bates, Camaioni and Volterra (1975) and used by Snyder (1976), the four categories of spontaneous, intentional communications under the "showing function" were the following:

Showing off. This behavior was coded when the infant performed or acted in such a manner as to obtain the mother's attention and resulted in the mother smiling or laughing. An example of this behavior is the following:

> Ex.: Andy is pushing down hard on the rocker and makes it bounce back with a loud noise. He then looks at the mother and laughs, as if to say "look what I can do" or "look at me." The mother would smile or laugh, attending to the infant and causing the infant to repeat his/her behavior, laughing with the mother.

Giving, showing and/or pointing. This behavior was coded when the infant used an object to extend to the mother in order to get the mother's attention. This was most often accompanied by a vocalization and looking at the mother's face or hands. The mother could then accept the object, reject it, remark about it or ignore it. The mothers most often attended to the object by providing the appropriate linguistic label for the object. The following is an example of such a sequence:

> Ex.: Scott is sitting at the little table coloring. Mother is seated in the big chair. Scott looks up at the mother--vocalizes--extending a crayon to her. Mother looks at

Scott--replies "yes, I see your blue color." Scott then looks back down at his paper and continues coloring.

Ritualized signal. This behavior was coded whenever the infant first obtained the mother's attention, by looking at the mother and vocalizing, or by going over to the mother and tapping her leg, and then, bringing the mother's attention to the object. The following is an example of such a sequence:

Ex.: Lori has been playing with the puzzle on the floor while her mother is reading a magazine. Lori looks up at her mother; stands up and goes over to her mother, tapping her on the knee--while looking at her and vocalizing. The mother looks up at Lori and responds "What do you want?" Lori then toddles over to the puzzle piece--points to it--and looks at the mother. Mother then replies, "Isn't that a nice puzzle?"

Linguistic symbol. This category was coded when the infant used a linguistic symbol to communicate with the mother in order to get the mother to attend to the object of interest. This category of behavior also involved looking at the mother and pointing to or giving the object to the mother. It is differentiated from the other categories by the fact that the infant used an actual linguistic symbol, as opposed to a vocalization. An example of this sequence of behavior is the following:

Ex.: Karissa is playing with the doll and "feeding" it with the plastic bottle. She looks up at the mother--vocalizes "baby." The mother looks at the infant and doll and replies--"Feed the baby."

Four more categories were established in order to code a second function of communications, which has been termed "protoimperative" by Bates (1976). This function consists of requests or commands made by the infant to the mother in order to attain an object or require the mother to act. This function is referred to as the "requesting function" of communications in this study. The existence of this function as used by infants has been well supported by recent research (Bates, Camioni and Volterra, 1975; Halliday, 1975; Snyder, 1976). As with the "showing function," the "requesting function" categories of spontaneous, intentional communications were devised to be consistent with the developmental progression of behaviors identified with this function (Bates, 1975; Snyder, 1976). They consist of the following four categories:

Fussing and reaching for the object. This category of behavior was coded whenever the infant obviously wanted an object, attempted to get it and was unsuccessful, but did not communicate to the mother for help. The mother's response to the infant was critical in validating the infant's use of a request. An example of this would be:

Ex.: Erik toddles over to the door, reaches toward the handle--fussing or crying. He does not look at the mother or make any sign of a request. The mother then says, "No, you can't go outside right now. Play with the toys"--while looking at the infant.

Reaching for an object, then looking at the mother. This category was coded whenever the infant reached for an object, fussed or vocalized, then turned to the mother--looking at her or her hand--while vocalizing. This category was characterized by the infant's recognition that the mother could be the means for obtaining the desired goal. An example of this category of behavior is the following:

Ex: Chrissy is seated at the little table coloring. The red crayon is on the floor near her mother, who is seated on the floor next to Chrissy. Chrissy looks at the red crayon--reaches for it--and fusses. She then looks at her mother--fussing--while extending her arm toward the crayon. The mother looks at Chrissy, then picks up the crayon--handing it to Chrissy, replying--"Oh, you want the red crayon."

Ritualized signal. This category is similar to the third category of the "showing function," only the infant's intentions are to request assistance of the mother. This category was coded when the infant first obtained the attention of the mother, and then made a request by fussing and pointing. The infant

could obtain the mother's attention by going over to her and tapping her on the leg, or by standing in front of the mother and vocalizing/fussing, or some such similar behavior. When the mother asked the infant what s/he wanted, interpreting the infant's behavior as a request, the infant then brought the mother's attention to the object by pointing or extending his/her arm toward it. An example of this category of behavior is the following:

Ex.: Mother is reading a magazine. Tony, seated on the floor with the gradated ring stack, looks up at his mother and makes a loud vocalization. The mother looks down at him, and says, "What's the matter?" Tony then pushes down hard on the gradated ring--fussing because it won't fit. He takes it off and extends it to the mother. The mother gets out of the chair and moves to the floor where the infant is, saying, "OK, I'll help you get it on."

Linguistic symbol. This category was coded whenever the infant used a word that indicated a request or command, or was interpreted by the mother as a request or command. The linguistic symbol was most often accompanied with looking behavior at the mother and extending or showing the object with which s/he needed assistance. An example of this behavior category is the following:

Ex.: Teddy is seated on the floor playing with the puzzle, trying to put it together. He cannot make it fit right. He looks up to his mother--extending the puzzle piece to her--saying, "Help." The mother looks at Teddy, then goes to him and assists him in putting the puzzle together.

A ninth category of behavior was identified which could not be coded as an intentional communicative behavior reliably, that of identifying objects. There exists some controversy in the literature as to whether or not the infant's labeling of objects is an intentional communicative behavior (Bates, 1976; Dore, 1974; Gruber, 1973; Halliday, 1975). In this study, the labeling category has been used as a measure of how often the infant vocalized or verbalized without the accompanying sequence of behaviors required to be coded as an intentional communication to the mother.

Certain behavioral characteristics were used to assist in determining whether or not the infant had made an intentional communicative act. In addition, these behaviors and the sequence with which they occurred were critical in determining the appropriate category for coding the communicative attempt. The behavioral evidence used has been identified by others (Bruner, 1975; Dore, 1974; Harding & Golinkoff, 1979; Snyder, 1976) and consists of the following:

(1) the infant's utterance, vocalizations or verbalizations (including intonation and inflection);

(2) the infant's non-linguistic behavior, e.g., pointing, gesturing, showing, facial expressions, looking at object;

(3) the mother's behavior and response to the infant, both verbal and non-verbal;

(4) the contextual cues of the setting environment.

The dependent variables, then, obtained from the free play interaction session, consisted of nine categories of behavior. Eight categories were spontaneous, intentional communicative acts by the infant to the mother. The ninth category was a general category of labeling behavior. Vocalizations made by the infant in response to the mother were not coded. The measures included in this study, therefore, do not include every instance of infant vocalization. A total frequency was obtained by summing all spontaneous communicative initiations across both function types. The "showing" frequency was those initiations that were coded in one of the four "showing" categories only, while the "requesting" frequency was all those initiations that were coded as one of the four "requesting" categories from the free play interaction session. The proportion of communicative acts for each category coded was obtained by dividing the total number of communicative instances for each category by the total number of communicative acts within each function. For the "showing" function this consisted of four proportions, S1 - S4, from the free play data. The "requesting" function also consisted of four proportions, R1 - R4. In addition to the frequency and

proportional variables obtained as described above, a measure of the most sophisticated level of communications used by each infant was obtained by collapsing categories 3 and 4 of the "showing" proportions to obtain a single proportion for the highest level of communicative behaviors observed. The labeling category was not included in the proportional data.

Experimental Communications Task Measure

The experimental communications task was initially piloted on a group of infants representing the three groups listed in this study. This task was used to evaluate the infants' use of the "requesting function" of communications. The presentation of the ten stimulus items resulted in ten communicative instances by the infant. Categories identical to those defined in the previous section for the "requesting function" were used for coding the behaviors. The resulting proportion of communicative acts observed within each of the "requesting function" categories was coded (R1 - R4).

Additional Descriptive Variables

Several additional measures were obtained to assess the relationship between the infants' communicative behaviors and other infant characteristics.

Cognitive Development Measures

Bayley Scales of Infant Development (BSID). A general mental development index (MDI) was obtained from the administration of the BSID. The MDI was used to assess intellectual differences between the three groups (HRE, HRC, and MCC). In addition, only those items from the BSID considered to be assessing receptive and expressive language were used to provide data on the number of language items passed on a standardized test. (Appendix G lists the number of items from the BSID included in the language item analysis.)

Uzgiris-Hunt Ordinal Scales of Psychological Development. A measure of the infant's sensorimotor intelligence as measured by the Uzgiris-Hunt Ordinal Scales of Psychological Development was obtained from another study on FPG infants at 15 months of age. The review of literature indicated that 5 scales, out of the 6 available scales, might be related to the infant's communicative development. The following five scales therefore were used:

(1) The development of visual pursuit and the permanence of objects

(2) The development of means for obtaining desired environmental objects

(3) The development of imitation: vocal and gestural

(4) The development of operational causality

(5) The development of schemes for relating to objects.

Each scale consists of tasks representing the 6 stages of sensorimotor development. Infants were divided into two groups for each scale: (a) those at Stage 6 (representing the highest level of sensorimotor behavior), and (b) those below Stage 6, to provide data for part of the analysis. In addition, highest scale step passed for each scale was used in an analysis concerning the level of sensorimotor development and its relationship to the infant's level of communication.

Social Development

Dyadic Maternal Play and Maternal Directiveness. Data collected for another study being conducted at the FPGCDC with the same group of infants provided information on: (1) the duration of time the dyad played or read together; (2) the duration of time the mother read alone; and (3) the frequency of attempts by the mother to modify the infant's behavior or activity. The behaviors are part of the Reciprocal Control Category System developed by Farran and Haskins (1977).

Data Analysis

Two major hypotheses were postulated in this study. Hypothesis 1 was concerned with a group comparison of the total amount of showing and requesting behaviors using analysis of variance and t-tests. Hypothesis 2 dealt with

a group comparison of the developmental distribution of the infants' communicative initiations across categories using a test of proportions. In addition, several questions were raised in an attempt to provide additional explanations for the relationship between the infants' communicative level and other infant characteristics, looking at both group differences and correlations between measures. The data analysis procedure will be discussed for the hypotheses and additional questions below.

Hypothesis 1

Hypothesis 1 was stated as the comparison of the frequency with which the infants from each of the three groups, HRC, HRE, and MCC, initiated spontaneous communications with their mothers. A three-group analysis of variance was performed on the total frequency, showing frequency and requesting frequency to determine overall group differences and level of significance. When appropriate, individual t-tests were conducted between HRC-HRE, HRC-MCC, and HRE-MCC groups.

Hypothesis 2

To obtain an approximate determination of whether or not the distribution of the proportions of spontaneous communicative initiations across the developmentally based categories, for both the "showing" and "requesting"

functions, was the same for all three groups, a test of proportions (Fleiss, 1973) was used. This is a chi-square procedure that allows a determination of overall significance levels, and then when appropriate, two-group chi-square analyses, in order to ascertain which group differences contributed to the overall significant difference.

Additional Questions

In order to compare the cognitive level of development between the three groups, an analysis of variance, with subsequent two-group comparisons (t-tests) was performed using the MDI scores, which represented the infants' general mental development. In addition, in order to determine whether or not infants at Stage 6 on the Uzgiris-Hunt Scales of sensorimotor development exhibited a larger proportion of their communicative behaviors at the highest communication level than those infants below Stage 6, t-tests were performed for each scale on the total sample.

Finally, group differences in the frequency of the use of "labels" during the free play interaction sessions were analyzed. Again, an analysis of variance was conducted, and t-tests were used for subsequent two-group comparisons when appropriate.

Several additional questions were posed and investigated. First, to determine the relationship between the

proportion of the highest communicative level observed (proportion of category three and four of the "showing" function collapsed) and the total number of language items passed from the BSID, a product-moment correlation was performed.

Secondly, to ascertain whether or not a relationship could be found between the infants' highest communicative level observed and their sensorimotor performance, that is, the highest scale step passed for each scale of the Uzgiris-Hunt Ordinal Scales, a correlational procedure was used.

Thirdly, to investigate whether or not a relationship existed between dyadic mutual play variables and maternal directiveness during the free play interaction session with the proportion of the highest communicative level observed, a product-moment correlation was performed.

Reliability

Free Play Interaction Observation

The method for determining observer reliability was similar to that used by Ramey, O'Brien, Finkelstein (Note 11). A random five minute segment from each video tape for every infant was selected and coded by two independent observers. After coding the tape separately, it was viewed jointly until 100% consensus was reached on each

instance and category of behavior that was identified and coded; at that point the rest of the tape was transcribed and coded by one observer.

Reliability for the random 5 minute segments prior to 100% consensus was calculated for the frequency, communications categories and labeling category data separately. For the frequency data, each instance of a spontaneous communicative initiation was transcribed. Reliability was determined by dividing the number of agreements by the total number of agreements and disagreements. The reliabilities for the free play observation frequency data, based on random 5-minute segments from each infant's tape, were the following, by group:

Frequency Data

	HRC	HRE	MCC
Mean	.665	.598	.671
Range	.20 - 1.00	.27 - 1.00	.20 - 1.00

Reliability on the categorization of each communicative instance into one of eight developmental categories was calculated by dividing the number of category agreements by the total number of communicative instances initially agreed upon. The reliabilities for accurate categorization of agreed upon communicative instances, by group, were the following:

Categorization of
Communicative Instances

	HRC	HRE	MCC
Mean	.846	.821	.934
Range	.50 - 1.00	.00 - 1.00	.666 - 1.00

The labeling data reliabilities were calculated using the percentage agreement method. Reliabilities were determined by dividing the number of agreements of a labeling instance by the total number of agreements and disagreements. The reliabilities for this measure, by group, were:

Labeling Data

	HRC	HRE	MCC
Mean	.809	.748	.900
Range	.50 - 1.00	.50 - 1.00	.785 - 1.00

It is obvious from these data that the most difficult behavioral coding was in determining whether or not a communicative instance had been initiated by the infant. Once the communicative initiation was agreed upon, there was little discrepancy in determining in which category to place it. One reason for the initial difficulty was the idiosyncratic nature of the 20 month olds' preverbal utterances and interactions. Because of this idiosyncracy, it was decided to obtain reliability on each dyad prior to coding the entire tape.

Experimental Task Data

One observer coded the infant's behavior live from behind an observation window while the experimenter administered the task, and also coded the infant's behavior during the administration. Video tapes were then reviewed independently by each observer to check the initial coding by the administrator of the infant's behavior. The coding of the ten items by the two independent coders was then compared. Consensus agreement between the raters was then reached before assigning the infant a final rating. This method was used for all infants in every group.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this investigation was to determine the effectiveness of day care intervention on the use of intentional communication behaviors in a group of low socioeconomic status infants at-risk for developmental retardation. In addition, their behaviors were compared to those of a normally developing middle-class sample. The results of this investigation are presented in two sections. The first section deals with the two major hypotheses of this study. These were concerned with: (1) a three-group comparison of the frequency of intentional communicative initiations; and (2) the distribution of communicative behaviors across developmentally-based categories. The second section deals with some questions concerning the relationship between the infants' communicative level and several other nonlinguistic infant characteristics. Specifically, the other characteristics were: (a) general mental development and language developmental status as measured by the Bayley Scales of Infant Development; (b) sensorimotor-stage level as measured by the Uzgiris-Hunt Ordinal Scales of Psychological Development in Infancy; (c) the interactive

behaviors between mothers and infants during the free play observational session; and (d) the amount of linguistic labeling evidenced during free play by the infants.

Intentional Communicative Initiations--Frequency and Developmental Distribution

Two major hypotheses were postulated prior to the initiation of this investigation. They dealt with a three-group comparison of, first, the frequency with which infants initiated communicative interactions with their mothers, and secondly, the developmental level at which they communicated intentionally. Each hypothesis will be discussed in turn.

Hypothesis 1: Frequency of Spontaneous Communicative Initiations

Hypothesis 1. The total frequency of communicative initiations exhibited during a free play interaction session will not differ for the high-risk experimental group (HRE) experiencing day care intervention and the normally developing middle-class comparison group (MCC); and both of these groups will exhibit a higher frequency than the high risk control group (HRC) receiving no day care intervention.

To test Hypothesis 1, the total frequency of intentional communicative instances used by infants during the

free play interaction session with their mothers was compared across the three groups. Although the total frequency scores represent two distinct functions of communications, showing and requesting, too few instances of the "requesting" function type by each group were obtained so that a group comparison of frequency within each communicative function type could not be conducted. Therefore, only results using the total frequency score (shows and requests) will be reported here. A summary of the mean frequencies within each function type (as well as for the total), standard deviation and range exhibited by each group may be found in Table 2. (Data from one HRE infant and one HRE infant was not available for the free play situation.)

A three group analysis of variance of the total frequency of intentional communicative initiations used revealed significant differences among the groups F (2, 35) = 5.43, p .009. Subseque..t t-tests to compare group means indicated that the high-risk experimental group (HRE) did not significantly differ from the middle-class comparison group (MCC), and that both the HRE and the MCC groups made significantly more spontaneous communicative initiations than the high-risk control group, $t(22) = 2.46$, $p < .02$, and $t(23) = 3.19$, $p < .005$, respectively.

The results on the frequency of spontaneous communicative intiations made by the infants to the mother during the free play interaction session support Hypothesis 1. High-risk infants receiving day care intervention did not differ from a normal, middle-class group of infants in

Table 2

Mean Communication Frequency Scores, Standard Deviations and Range of High Risk Control, High Risk Experimental, and Middle Class Comparison Groups During Free Play Situation

Group	N[a]	Total Frequency of Communicative Attempts			Show Frequency			Request Frequency		
		Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
High Risk Control	11	13.73	7.34	3-25	11.73	7.82	0-24	2.00	3.07	0-10
High Risk Experimental	13	22.08	9.31	9-39	19.46	9.30	8-39	2.62	3.04	0-8
Middle Class Comparison	14	31.43	19.03	7-78	25.71	14.10	7-51	5.71	7.05	0-27

[a]Number of high risk control and high risk experimental infants reflects the fact that data on two infants from each of these groups during the free play situation was unavailable.

terms of the frequency with which they initiated interactions with their mother of a communicative nature. The HRC group, those receiving no day care intervention, however, made significantly fewer initiations to their mothers than either the HRE or the MCC group.

Hypothesis 2: Developmental Distribution of Communicative Initiations

Hypothesis 2. The high-risk experimental group (HRE) and the normal, middle-class comparison group (MCC) will not differ on the distribution of their spontaneous communicative initiations across developmentally-based categories, and both the HRE and MCC groups will exhibit a higher proportion of their communicative behaviors at the highest developmental level (the use of linguistic symbols to communicate), than the high-risk control group (HRC).

To test Hypothesis 2, data on the use of the showing function was obtained from the free play situation, while data on the use of the requesting function was obtained from the experimental task situation. Four categories were used to code each instance of an intentional communicative initiation. As described earlier, the "showing" function categories are represented by:

1. Showing off
2. Giving, showing and/or pointing

3. Ritualized signal
4. Linguistic symbol

while the "requesting" function categories can be represented by:

1. Fussing and reaching for the object
2. Reaching for an object--then looking at the mother
3. Ritualized signal
4. Linguistic symbol.

Hypotheses concerning the distribution of communicative initiations across developmentally-based categories were stated separately for each function of communications, and the results will be presented separately.

Hypothesis 2(a). The HRE and MCC groups will not differ on the distribution of their spontaneous communicative initiations of the "showing" function type across four developmentally-based categories, and both the HRE and MCC groups will exhibit a higher proportion of their communicative behaviors at the highest developmental level than the HRC group.

Data for the analysis of the use of the "showing" function type was collected from the free play interaction session between the infant and his/her mother. In order to obtain an estimate for the comparison of the distribution of proportions of communicative behaviors observed across the four "showing" categories, a chi-square procedure

reported by Fleiss (1973, chap. 9) for the comparison of more than two proportions was used. The Fleiss chi-square statistic is given by:

$$\chi^2 = \frac{1}{\bar{p}\,\bar{q}} \sum_{i=1}^{m} n_{i.}(p_i - \bar{p})^2$$

where n_i is represented by the total number of behaviors coded across the four categories for each group; p_i represents the proportion of behaviors found in a particular category out of the total frequency of behaviors coded across the four categories, for each group; $\bar{p}$ is the overall proportion, represented by:

$$p = \frac{\sum n_{i.}\, p_i}{\sum n_{i.}}$$

and where $\bar{q} = 1 - \bar{p}$.

In order to isolate sources of significant differences a method reported by Fleiss (1973) is used, with the chi-square statistic for a two group comparison with m proportions represented by the following:

$$\chi^2_{diff} = \frac{1}{\bar{p}\,\bar{q}} \times \frac{n_{(1)}\, n_{(2)}}{n..} (\bar{p}_1 - \bar{p}_2)^2$$

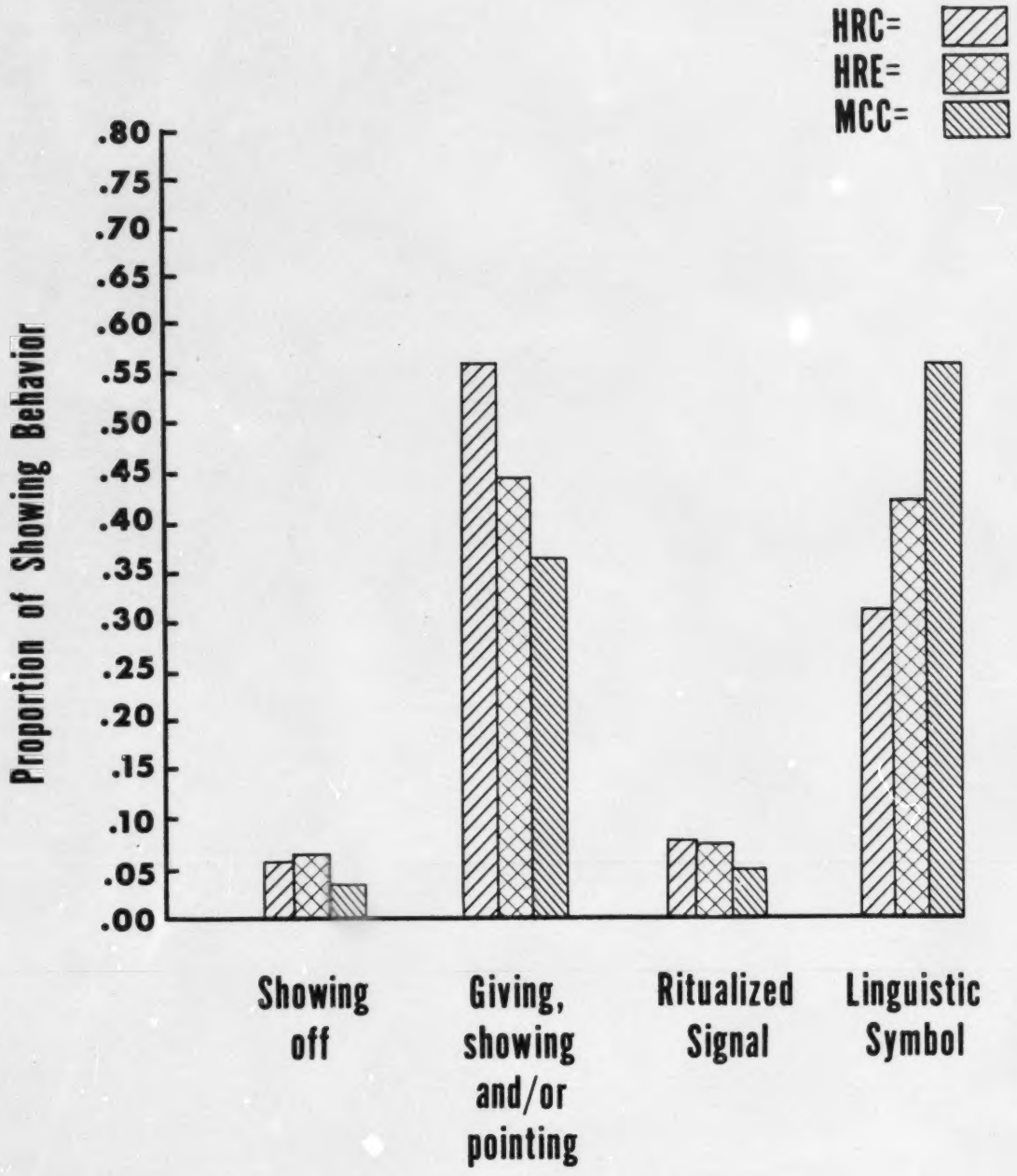
with one degree of freedom.

A test of proportions for each category was performed. Analyses of the first and third categories, showing off and ritualized signal did not produce significant differences. Both of these categories were low incidence categories. The

showing off category was a low developmental category and would be considered immature behavior for 20 month olds to exhibit on a large scale. The ritualized signal category was not observed frequently, probably because it requires the infant to obtain the mother's attention prior to showing the object to her. Since the mothers were in close proximity and very available to the infants in the free play setting, this was infrequently observed. These two categories will not be discussed further.

As can be seen in Figure 1, for all three groups most of the communicative initiations were found in the second and fourth levels of the showing function. These two categories represent: (1) giving, showing, and/or pointing, and (2) linguistic symbols. Only the proportions in the second and fourth categories of the showing function will be subjected to analyses for group differences.

The test of proportions revealed a significant overall difference among the groups in the use of the giving, showing, and/or pointing category, $\chi^2_{(2)} = 16.67$, $p < .001$, as well as for the linguistic symbols category, $\chi^2_{(2)} = 27.25$, $p < .001$. Further analyses of individual group differences revealed that the MCC group exhibited a significantly lower proportion of the giving, showing, and/or pointing category than either the HRE, $\chi^2_{(1)} = 4.74$, $p < .05$, or the HRC group, $\chi^2_{(1)} = 16.02$, $p < .001$. At the same time, the HRE group exhibited a significantly lower proportion of the giving, showing, and/or pointing category than did the HRC group,


HRC=
HRE=
MCC=
Proportion of Showing Behavior
.80
.75
.70
.65
.60
.55
.50
.45
.40
.35
.30
.25
.20
.15
.10
.05
.00
Showing off
Giving, showing and/or pointing
Ritualized Signal
Linguistic Symbol

$\chi^2_{(1)} = 4.52$, $p < .05$.

On the other hand, the MCC group exhibited a significantly higher proportion of the linguistic symbol category than either the HRE or HRC groups, $\chi^2_{(1)} = 11.29$, $p < .001$ and $\chi^2_{(1)} = 23.95$, $p < .001$, respectively. The HRE group used a significantly higher proportion of the linguistic symbol category than the HRC group, $\chi^2_{(1)} = 4.66$, $p < .05$. This would be expected since the MCC group was lower in the other 3 categories.

These analyses result in the rejection of Hypothesis 2(a) which stated that the HRE and MCC groups would not differ. The middle-class comparison sample was found to use significantly more linguistic symbols when initiating communicative interactions with the mother. However, the high-risk experimental group, as predicted, used more linguistic symbols to communicate in the free play session with their mothers than did the high-risk control group. This would seem to indicate that although the day care intervention program elevated the intentional communicative initiative skills of the HRE group above those of the HRC group, the communicative skills in social interactions were not elevated to the same level as those of the middle-class sample. Summary information on the proportion of showing behaviors observed within each category by group may be found in Table 3.

Hypothesis 2(b). The HRE and MCC groups will not differ on the distribution of their spontaneous communicative initiations of the "requesting" function type across

Table 3

Proportion of Intentional Communicative Initiations of High Risk Control, High Risk Experimental, and Middle Class Comparison for the "Showing" Function

		Show Proportions[a]			
Group	N	S1	S2	S3	S4
High Risk Control	11	.062	.558	.078	.302
High Risk Experimental	13	.067	.443	.075	.415
Middle Class Comparison	14	.033	.356	.058	.553

[a]S1 - S4 represent the four categories of "showing" as described in the text, observed during the free play situation.

four developmentally-based categories, and both the HRE and MCC groups will exhibit a higher proportion of their communicative behaviors at the highest developmental level than the HRC group.

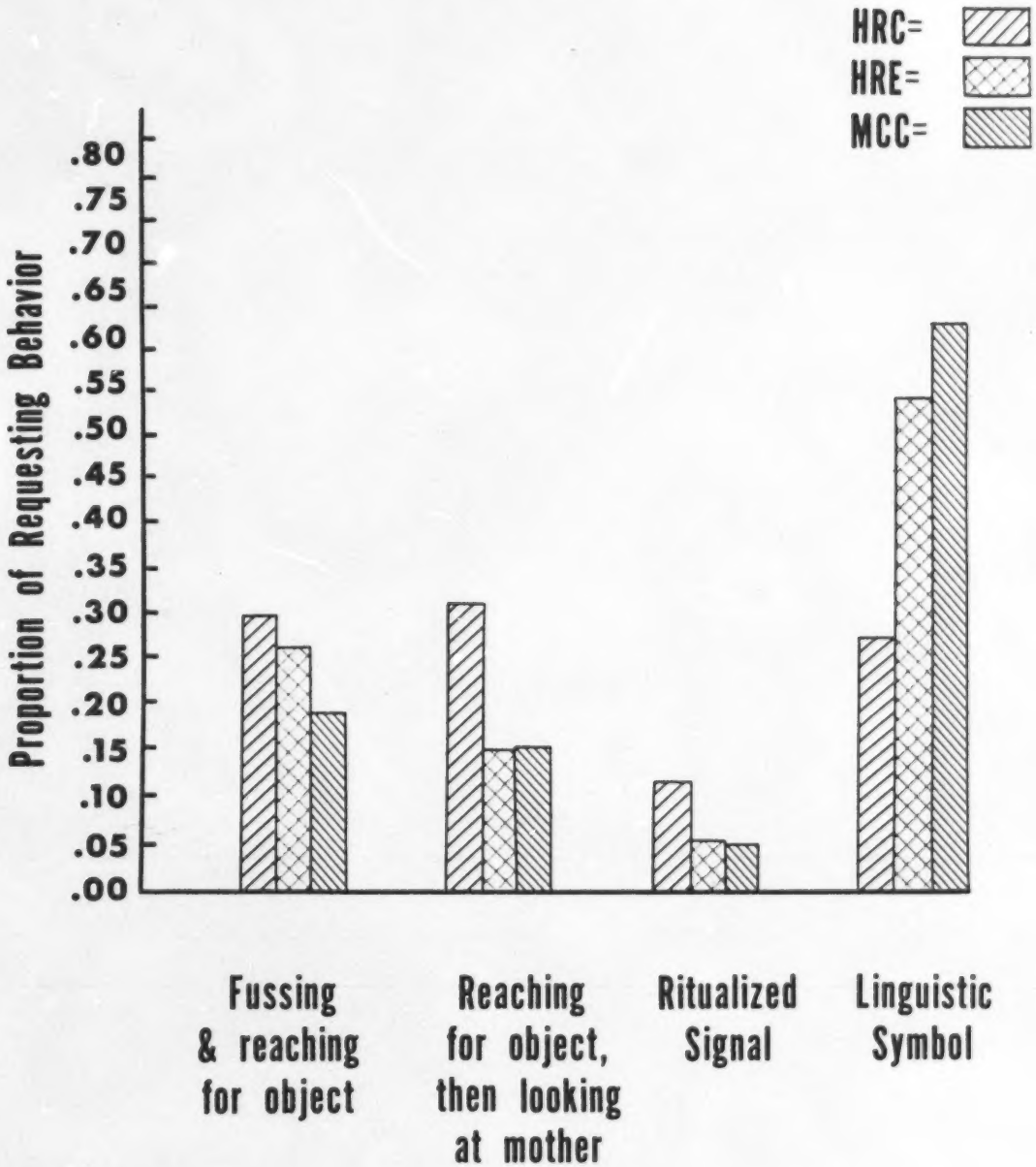
Data for the analysis of the use of the "requesting" function of communications was collected from two different situations, the free play interaction and the experimental task situation. Because of the low frequency of "requesting" behaviors observed during the free play situations, only the results from the experimental task will be presented.

The experimental task consisted of ten items to be presented to each infant. If the infant became overly upset or refused to cooperate, the session was terminated before all 10 items could be presented. This was the case for two HRE infants, one HRC infant, and no MCC infants. In addition, even though a particular item was presented, the infant may have refused to respond, that is, indicated no interest in trying to obtain it, which, therefore, made their response unscorable. There was a very low incidence of refusal behavior, with infants from all three groups responding equally well to the stimuli. Three HRE, three MCC and two HRC infants refused to respond to some of the items. However, the minimum level of responding of all infants was 80%. Proportions of responses for each infant were calculated using the total number of items responded to as the base unit.

The test of proportions (Fleiss, 1973) described in the previous section was also used to examine the distribution of the proportion of communicative behaviors of the "requesting" type. The comparison between the groups of the first and third categories, fussing and reaching for the object and ritualized signal revealed no significant group differences.

Three-group comparisons of the other two categories, (1) reaching for object--then looking at the mother and (2) using a linguistic symbol, were significant for each category, $\chi^2_{(2)} = 12.83$, $p < .005$ and $\chi^2_{(2)} = 30.10$, $p < .001$, respectively. Further analyses of individual group differences revealed that the HRE group did not differ from the MCC group in either of the two categories. Both the HRE and MCC groups exhibited significantly lower proportions in the second category, reaching for object--then looking at the mother, than the HRC exhibited, $\chi^2_{(1)} = 8.91$, $p < .005$, and $\chi^2_{(1)} = 8.99$, $p < .005$, respectively. At the same time, both the HRE and the MCC groups used significantly more linguistic symbols than the HRC group when requesting, $\chi^2_{(1)} = 18.08$, $p < .001$ and $\chi^2_{(1)} = 27.92$, $p < .001$, respectively. Figure 2 depicts the proportions of behaviors observed in the four categories of the "requesting" type for each of the three groups.

These results are consistent with Hypothesis 2(b) which stated that the HRE group would not differ from the


HRC=
HRE=
MCC=
Proportion of Requesting Behavior
.80
.75
.70
.65
.60
.55
.50
.45
.40
.35
.30
.25
.20
.15
.10
.05
.00
Fussing & reaching for object
Reaching for object, then looking at mother
Ritualized Signal
Linguistic Symbol

MCC group on the distribution of their proportions across the developmentally-based "requesting" type categories. Both the HRE and the MCC groups used more linguistic symbols to communicate their requests than the HRC group. These analyses indicate that for the "requesting" function of communication, the high-risk experimental infants were performing in a fashion similar to the middle-class group, with both groups using a high proportion of linguistic symbols to communicate wants and needs. The high-risk control infants, at the time of this study, used predominantly gestures to obtain objects at their request. Summary information on the proportion of showing behaviors observed within each category by group may be found in Table 4.

Relationship Between "Showing" and "Requesting" Measures

In order to determine the relationship between measures of the infants' intentional communicative initiations of the "showing" and "requesting" type across the two experimental settings, Pearson product correlations were conducted across the four groups. A summary of the correlations by category between "show" and "request" functions may be found in Table 5.

As indicated in Table 5, the use of the highest category of communications (S4 and R4), that is, the use of linguistic symbols, was significantly related between the "showing" and "requesting" functions. This level of

Table 4

Proportion of Intentional Communicative Initiations of High Risk Control, High Risk Experimental, and Middle Class Comparison for the "Requesting" Function

Group	N	Request Proportions[a]			
		R1	R2	R3	R4
High Risk Control	12	.296	.313	.122	.270
High Risk Experimental	14	.252	.153	.061	.534
Middle Class Comparison	14	.184	.154	.059	.603

[a]R1 - R4 represent the four categories of "requesting" as described in the text, observed during the experimental task situation.

Table 5

Correlation of Total Proportions of Communicative Instances by Category Between "Showing" and "Requesting"

Request Levels[a]	Show Levels[b]			
	S1	S2	S3	S4
R1	.11			
R2		.29		
R3			.03	
R4				.48[c]

Note: N = 37

[a]R1 - R4 represent the four categories of "requesting" described in the text.

[b]S1 - S4 represent the four categories of "showing" described in the text.

[c] $p < .003$

communicative development was the most unambiguous in terms of relating the "showing" and "requesting" behaviors. That is, if infants had achieved the level of linguistic symbolization, they could use words regardless of the function for which it was used. On the other hand, although the other three categories within each function are developmentally sequenced, the specific behavioral characteristics that are measured vary. For instance, the first category of the "showing" function is "showing off" behavior, as compared to the first category of the "requesting" function which consists of "fussing and reaching for the object." It may be that infants vary in the order with which they develop the functions of communications, achieving levels of the "request" function first, then a particular level of "show" function or vice versa. However, once the level of linguistic symbolization is reached, the infant's behavior becomes more consistent and predictable.

Communicative Level and Relationship to Additional Nonlinguistic Variables

Several additional analyses were conducted in order to assess the relationship between the infants' communicative developmental level and other significant infant characteristics. Each additional question set forth in this study will be addressed separately.

General Mental Development and Language Development Status

A measure of the infant's general mental development (MDI) was obtained by administering the Bayley Scales of Infant Development (BSID). Summary information on the mean MDI scores and standard deviation by group is presented in Table 6.

An analysis of variance, performed to determine differences in mental development between the three groups, was significant F (2, 37) = 8.96, $p < .0007$. Group comparisons of the means revealed that the HRE and MCC groups did not differ on the MDI, but that both groups were significantly higher than the HRC group, t (24) = 4.45, $p < .0002$ and t (24) = -4.04, $p < .0007$, respectively.

In order to assess the relationship between the infants' level of communication and the Bayley MDI measure, a specific communication score was calculated for each infant to reflect the proportion of his/her communicative initiations falling into the most sophisticated categories (category three and four combined) of both the "showing" and "requesting" function type. These scores were then correlated with the Bayley MDI measure using a Pearson product moment correlation.

The relationship between the Bayley MDI, as a measure of general mental development, and the proportion of the "showing" communicative initiations of the most sophisticated type was not significant, r = .23. Conversely, using

Table 6

Summary of Mean IQ Scores and Standard Deviations by Group

	Bayley MDI	
Group	Mean	Standard Deviation
High Risk Control	90.17	9.07
High Risk Experimental	110.93	14.45
Middle Class Comparison	114.79	20.61

the most sophisticated levels of communicating, the "requesting" function was significantly correlated with the Bayley MDI measure, $r = .50$, $p < .001$.

Because of the inconsistency in these results, it is not clear what the relationship is between mental development and level of communicative development at this age, 20 months. It appears that the group differences obtained in communicative initiations with the mother during the free play situation were not a direct result of group differences obtained in mental development, as measured by the BSID. However, since we know very little about the cognitive requirements of communicating as they relate to different functions of communication, such as "showing" and "requesting," it is difficult to determine why the "request" function behaviors were significantly related to mental development. It is possible that the two situations for the Bayley and for the communicative task were similar to each other, each representing a type of test. In two situations where maximum performance is required of the infants, one might expect a relationship in response.

To examine the relationship between the proportion of the most sophisticated communicative level used, determined as described above, and language development status as measured by items from the BSID, a Pearson correlation analysis was conducted. A highly significant correlation was found for both the "showing" function, $r = .44$, $p < .006$, and the "requesting" function, $r = .69$, $p < .0001$.

This would seem to add validity to the experimental measures of communicative competence, as well as provide evidence for a strong relationship between communicative level of development and expressive/receptive language development as measured by a standardized assessment instrument. (Appendix G shows the items from the BSID included in this language analysis.)

Sensorimotor Developmental Status

Only infants in the HRE and HRC groups were administered the Uzgiris-Hunt Ordinal Scales of Psychological Development in Infancy at 15 months of age. Two things were of interest: first, the relationship between early sensorimotor developmental status and later communicative developmental status, as observed in the free play interaction situation and during an experimental task; and secondly, whether or not group differences would emerge on the communicative measures at 20 months in these two situations between infants at Stage 6 on the Uzgiris-Hunt measure and those below Stage 6 at 15 months of age. Five of the Uzgiris-Hunt scales were used and were the following:

1. The development of visual pursuit and the permanence of objects
2. The development of means for obtaining desired events
3. The development of imitation: vocal and gestural

4. The development of operational causality
5. The development of schemes for relating to objects

A breakdown by group, HRC and HRE, on the number of infants at Stage 6 or below Stage 6 for each of the scales used in this study may be found in Table 7. As indicated in Table 7, no infants were at Stage 6 on the object permanence scale. More HRE infants than HRC infants contributed to the total number of infants functioning at Stage 6 levels in the analyses to follow, although many HRC infants were also represented at the Stage 6 level on various scales.

The first type of analysis consisted of dividing the infants into two groups--those at or above Stage 6 and those below Stage 6 at 15 months, for each of the 5 scales used in this study. This was achieved by determining the appropriate scale step for each scale that represented developmental characteristics equivalent to Piaget's and Stage 6 sensorimotor intelligence behaviors. A summary of the number of total infants at Stage 6 or below Stage 6 for each scale and the mean proportion of the most sophisticated communicative level used may be found in Table 8.

Pearson product moment correlations were obtained between the proportion of the most sophisticated communicative level and the highest scale step passed for each scale regardless of whether Stage 6 was achieved. Measures from both the free play interaction situation ("showing"

Table 7

Number of Infants by Group, HRC and HRE, at Stage 6 or Below Stage 6 on Five Uzgiris-Hunt Sensorimotor Scales

	Below Stage 6		At or above Stage 6	
Scale	HRC	HRE	HRC	HRE
Object Permanence	12	14	0	0
Means-End	8	9	4	5
Vocal Imitation	12	12	0	2
Gestural Imitation	4	2	8	12
Causality	6	3	6	11
Object Schemes	2	0	10	14

Table 8

Summary of Sensorimotor Stage Level by Scale and Proportion of the Highest Communication Levels of the "Show" and "Request" Function

	Show Function						Request Function					
	Below Stage 6			Stage 6 or above			Below Stage 6			Stage 6 or above		
Scale	N*	M	SD	N	M	SD	N	M	SD	N	M	SD
Object Permanence	23	.47	.26	0	--	--	26	.49	.33	0	--	--
Means-End	14	.48	.29	9	.47	.24	17	.48	.32	9	.51	.37
Vocal Imitation	22	.48	.27	1	.44	.00	24	.45	.31	2	1.00	.00
Gestural Imitation	6	.31	.25	17	.53	.25	6	.35	.37	20	.53	.32
Causality	8	.39	.26	15	.52	.26	9	.45	.33	17	.51	.34
Object Schemes	2	.45	.07	21	.48	.28	2	.33	.11	24	.50	.34

*Discrepancies between total N's between the "show" and "request" function is due to the fact that data from 2 infants during the free play situation was unavailable, and 1 infant observed used no initiating "showing" behaviors.

function) and the experimental task situation ("requesting" function) were used. A summary of the correlations by scale and function may be found in Table 9.

As the table indicates, the measures of sensorimotor development do not consistently relate to measures of communicative development. Measures of the "showing" function were significantly related to only one scale, the object permanence scale. No other scale was found to be statistically related to the measures of the "showing" function.

The correlational analysis between the sensorimotor scales and the communicative measures of the "requesting" function were also inconsistent across scales, as well as between the "showing" and "requesting" function. Only two of the five scales were found to be statistically significant--vocal imitation and object schemes.

These results indicate that for 20 month old infants in this study there was an insignificant relationship between their levels of communicative initiations and their sensorimotor development, as measured by the five Uzgiris-Hunt scales. This may indicate that nonlinguistic factors other than cognitive, or in addition to cognitive abilities are related to and affecting communicative development.

For those scales with a sufficient number of infants in both groups (6 or more), two-group comparison analyses were conducted. No significant differences between the groups were found for the Means-End, Gestural Imitation and Causality Scales. These results indicate that for the

Table 9

Correlations Between Sensorimotor Scales of Intelligence and Communicative Level of "Show" and "Request" Functions

	Show Function		Request Function	
Scale	r	p	r	p
Object Permanence	.41	.05	.10	.63
Means-End Relations	-.003	.99	.08	.70
Vocal Imitation	.19	.38	.55	.003
Gestural Imitation	.40	.06	.31	.13
Causality	.31	.15	.25	.21
Object Schemes	.17	.45	.52	.007

group of infants observed in this investigation, the level of sensorimotor development did not differentiate the infants in terms of the use of a more developmentally sophisticated level of communication used five months later. A summary of these analyses may be found in Table 10.

Dyadic Mutual Play and Maternal Directiveness

Since the infant's social development has been noted in the literature as a possible key component of language development, additional analyses were performed to determine whether certain measures of the social interactions of mothers and infants were related to the infants' use of developmentally more sophisticated communicative behaviors. This was achieved by using data from a study being conducted concurrently with the present investigation, which was concerned with the level and quality of involvement of the mother-infant social interaction. Measures of mutual social interaction were the following: (1) the amount of time the dyad played or read together; (2) the amount of time the mother read alone; and (3) the frequency of the mother's attempts to modify the infant's behavior or activity. Each of these measures was correlated with the proportion of infant initiations in the two most developmentally sophisticated levels. (The "showing" data was obtained from the free play setting, while "requesting" data came from the experimental task setting.) The subsequent analyses revealed no relationship between

Table 10

Summary of Two-Group Comparisons of Infants at Stage 6 or Below Stage 6 on Uzgiris-Hunt Sensorimotor Scales and Proportion of the Highest Communicative Levels of the "Show" and "Request" Function

	Show Function		Request Function	
Scale	t	p	t	p
Object Permanence	*		*	
Means-End	-.01	.99	.23	.82
Vocal Imitation	*		*	
Gestural Imitation	1.85	.10	1.14	.29
Causality	1.08	.30	.45	.66
Object Schemes	*		*	

*Insufficient numbers of infants in both groups to conduct analysis.

the measures of social interaction and the infants' use of the most sophisticated communicative level. Although the amount of time the mothers spend with their infants may be a significant factor in promoting language and communications, generally, the specific relationship may not be revealed in 20 minutes of free play. It is also important to note that children's use of the highest level of communicative initiations was not solely a function of time spent with the mothers during the session. Therefore the score obtained for children during free play can be thought of as somewhat independent of the context in which it was obtained. A summary of the analyses may be found in Table 11.

Linguistic Labeling

Linguistic symbols used by infant without accompanying communicative behaviors and not elicited by the mother were categorized as labels. This measure was used as a gross indicator of the amount of spontaneous "talking" other than communicative verbalizations in which the infant engaged. The mean number of labels (and standard deviations) for the three groups were: HRC, 11.00 (6.77); HRE, 17.62 (11.45); MCC 26.64 (10.93). An analysis of variance between the three groups indicated a significant main effect for group, F (2, 35) = 7.55, $p < .002$. Subsequent analyses of mean difference revealed that the MCC group did significantly more labeling than either the HRC or HRE groups, t (23) = -4.39, $p < .0002$

Table 11

Correlations Between Social Interaction Measures and the Infant's Most Sophisticated Communicative Levels of the "Show" and "Request" Functions

	Mutual Interaction		Mother Reads		Mother Modifies	
	Show	Request	Show	Request	Show	Request
Highest Communicative Level	-.07	-.06	.09	.14	-.11	-.30

and t (25) = -2.09, $p < .05$. The HRC and HRE groups did not differ significantly from each other, t (22) = 1.75, $p < .10$.

Pearson product moment correlations were used to determine the relationship between the use of labels during the free play session and the proportion of communicative behaviors at the most sophisticated level during free play and the task. The measure from the "showing" function was not significantly correlated with labeling behaviors taken during the same free play interaction session, $r = .29$, $p < .08$. However, the infant's level of communicating during the experimental task, which measured the "requesting" function, was significantly correlated with labeling, $r = .42$, $p < .008$.

From these results it appears that the middle-class infants in this study used language of all types more than did the high-risk infants. They not only communicated effectively, but "practiced" to themselves by labeling when not in a communicative activity. The high risk experimental infants, although not differing from the middle-class in terms of the frequency with which they communicated to their mothers or to the experimenter, talked less when not interacting. In other words, when playing alone, they did not practice using their language and linguistic symbols. The high risk control group, on the other hand, consistently showed a very low frequency of using their language--whether it was to communicate or to label.

Summary of the Results

This research was concerned with the effects of day care intervention on the spontaneous use of communication behaviors by three groups of infants--a high-risk control group, a high-risk experimental group, and a middle-class comparison group. The results of this research have led to the following conclusions:

1. High-risk experimental infants receiving day care intervention did not differ from middle-class infants on:

   a. the total frequency of intentional communicative initiations made to their mothers;

   b. the developmental level at which "requesting" type communications were made during an experimental task;

   c. mental development as measured by the Bayley Scales of Infant Development.

2. High-risk control infants, receiving no systematic intervention, exhibited a lower level of performance than either the high-risk experimental or the middle-class infants on:

   a. the total frequency with which they spontaneously initiated a communicative interaction with their mothers;

b. the developmental level at which both "showing" and "requesting" type communicative initiations were made:

c. mental development as measured by the Bayley Scales of Infant Development.

3. The high-risk experimental infants did not exhibit communicative behaviors as developmentally sophisticated as the middle-class infants when initiating communications of the "showing" type function to their mothers during free play.

4. The high-risk experimental infants did not label objects and activities as frequently as the middle-class infants.

5. The following analyses yielded inconsistent results:

a. The general mental development and language development status and the use of a higher developmental communicative initiation.

b. The attainment of sensorimotor stage 6 by 15 months of age and the level at which the infant is communicating at 20 months of age.

c. The relationship between the highest scale step passed for each sensorimotor stage at 15 months of age and the infants' use of

a more sophisticated communicative level of initiations at 20 months of age.

d. The amount of mutual play engaged in between the infant and his/her mother, as well as the frequency of maternal directiveness of the infant's activities, and the level at which the infant was communicating.

The relationship between these four variables and communicative level of development has not been established in this study.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this research was to determine the effects of day care intervention on the frequency with which infants initiate communicative acts and the developmental level at which they are communicating at 20 months of age. The major hypotheses of this study were confirmed. High risk infants attending day care intervention initiated communicative behaviors more often to their mothers than did infants receiving no day care intervention. Moreover, the frequency of their communicative behaviors was equal to a middle-class comparison sample. The developmental level at which the high risk day care infants initiated "showing" and "requesting" communicative acts was significantly more advanced than that of the high risk infants not attending day care intervention. The high risk day care infants' "requesting" communicative acts were equal to that of the middle-class sample.

In order to test the hypotheses of this study, the communicative behavior of three groups of infants was observed in two different situations. High risk infants who had experienced day care intervention (HRE), high risk infants who had not experienced day care intervention (HRC),

and a middle class comparison group of infants (MCC) were observed in a free play interaction session with their mothers and during an experimental task. The frequency of their communicative behaviors and the proportion of communicative behaviors within each of four developmentally-based categories of the "showing" function of language, as well as four developmentally-based categories of the "requesting" function of language were measured. Video- and audio-tape recordings of each individual sessions were transcribed.

The following summary and conclusion will focus on the major findings of this study and discuss possible interpretations of the day care effectiveness in contributing to the results.

Differences between High Risk Experimental and High Risk Control Infants

For the infants observed in this study, day care intervention did influence communicative behaviors. Although there are no previous efficacy or training studies concerned with communicative behaviors of this nature, there are several plausible reasons why the day care environment facilitated communicative development.

The HRC infants did significantly more poorly than the HRE infants on all measures. It may be that the control infants' daily language environment is different from that of the day care environment and does not promote early language and the development of communications. Other work at

the Frank Porter Graham Child Development Center suggests that middle class mothers talk more to their infants than low income mothers (Ramey, Farran, and Campbell, 1979). The HRC infants primarily spent their days in their home instead of in the day care environment. Those homes are characterized by low income, with mothers of a lower educational background (average level of education = 10 years), and consisting of a larger number of people in a small setting. It is plausible that in a home environment where there are more people, fewer verbalizations are directed to the infant. In addition, because of each infant's idiosyncratic gestural system, there may be less responsivity to the infant's communicative attempts.

The HRE infants, on the other hand, were attending day care and were not spending their days at home. They receive language input from trained teachers, which is more similar to the middle class language environment. The day care curriculum goals are to promote growth and development, with a particular orientation toward promoting language interactions. Although the day care environment is a group setting, the teachers' behaviors during the day are oriented toward the infant. Therefore, initiations by the infants in the form of requesting and showing objects to the teacher may be responded to more readily.

While the day care environment, with the specific goal of intervention, may promote initiating behaviors, it is also possible that the additional number of adults, who are

attempting to promote development, may actually lead the infant to assume the universally accepted mode for communicating--the use of linguistic symbols--in order to be understood. This would result in the adoption of developmentally more advanced behaviors as opposed to the use of idiosyncratic gestures at an earlier age, as was exhibited by the HRC group.

While the day care environment enhances many different processes, another plausible explanation for the HRE's superiority was the fact that they performed significantly better on the Bayley Infant Scales of Mental Development (MDI) at 18 months of age than the HRC infants. However, the statistical relationship between the MDI measure and the communicative measures was inconsistent; the "requesting" behaviors were significantly related to the MDI scores, while the "showing" behaviors were not. There may be several explanations for this inconsistency.

Since an experimental task setting was used to obtain a measure of the infants' use of the "requesting" function of language, it was more similar to the testing situation used for administering the Bayley Infant Scales test. These settings require less idiosyncratic behaviors by the infants in order to be understood and interpreted and may have tended to maximize the infants' performance. On the other hand, the HRC infants may have been more intimidated by the stranger and setting than the HRE infants, and hence performed more poorly. It should be noted, however, that the control infants initiated a request in this setting for as

many toys at a frequency level similar to the other two groups. However, their requests were at a lower developmental level.

There may be another explanation for differences found between the performance levels of the two functions of language. Different factors in the environment may influence the development of different communicative functions. This would result in one type of function developing first, with an orderly, sequential development of functions within any one infant, and possibly for the group as a whole. Of course, it may be that the MDI measures may not be related to the communicative behaviors measured in this study because the type of language being tapped by the MDI is of a different nature. That is, the MDI language items primarily measure the infants' responses to directions from the examiner. The communicative measures are based on the infant initiating a response to the test stimuli--which is a more difficult behavior.

Differences between High Risk Experimental and Middle Class Infants

The HRE infants' communicative behaviors approached the performance level of the MCC infants on the total frequency of initiating behaviors and the developmental level of the "requesting" function. It is possible that the factors influencing the development of more advanced behaviors are similar in the two environments--the day care setting and the middle class home. The language input may

be qualitatively similar. Indeed, Ramey, Farran and Campbell (1979) have found that infants from middle class homes receive more verbal input from their mothers during infancy than either a group of lower socioeconomic status infants attending day care or a randomly assigned control group. This finding suggests that the day care intervention does not alter the behavior of the mothers of infants from low socioeconomic homes. Given the random assignment to groups, differences in the performance of the infants would have to be attributed to the day care program.

Since the HRE and MCC groups did not differ on their general developmental level as measured by the MDI, similarities on the communicative measure might be attributed to the similarities in their general psychological development. However, for all three groups as a whole, there was no linear relationship between communicative level, at least as evidenced in the request task, and the MDI measure. The request measure was obtained during a situation more like that of the MDI, which involved interaction with the examiner. The "showing" behaviors were obtained during a free play interaction with the mother. The fact that the HRE did not perform as well as the MCC on this function may be due to a carry-over of performance into the situation with the mother. Since the infants were interacting with their mother, it may have resulted in somewhat depressed scores. By assessing the infants' communicative level in an experimental task situation with an examiner, the effects

of the day care intervention may be more clearly delineated. This would explain the performance differences of the HRE group on the two functions of communications, "showing" and "requesting," when comparing it to the MCC group. HRE infants did not communicate on as high a level as the MCC group using the "showing" function. The use of this function was measured during a free play interaction situation with the mother. Therefore, scores on this function may reflect the idiosyncratic interaction patterns of the infant with the mother.

There is no data available to characterize the mothers' talk to the infants in this study. It may be that under the mother's influence and control the infant behaves differently. The infant may respond more to the mother's interactional patterns rather than initiating on his own volition, as in the experimental task setting. Since one experimenter administered the experimental task to all the infants, variance due to the interactional style of the adult was minimized for the "requesting" measure. The experimenter attempted to maximize each infant's performance by not responding immediately to an initial request, thus requiring the infant to repeat his request. In many instances, this resulted in a higher level of communications in order to make the request more clear. The HRE mothers may have been more willing to accept less developmentally sophisticated communicative behaviors.

Relationship of Communicative Behaviors to Nonlinguistic Factors

Cognition and Language

This study was concerned with determining whether or not there are cognitive prerequisites to langauge, as suggested by previous research. The results do not support this notion. In addition, an inconsistent relationship was found between the infants' performance on the subscales of the Uzgiris and Hunt Ordinal Scales as a measure of sensorimotor development and their performance on the measures of communications. Hence, in accordance with the empirical models identified by Bates (1979), neither the notion of a shared, underlying structure for language and cognition, nor direct causation between the two is supported by this study.

Because of the inconsistencies in the design and results of studies related to the relationship between language and cognition, comparisons, and hence, conclusions, are not possible. Several methodological problems must be remedied before we can determine how sensorimotor behaviors interact with early language development. The Uzgiris and Hunt Ordinal Scales have been almost universally used as the measure of sensorimotor development, providing us with a consistent tool for assessing the infants' developmental status. However, the second revision of this instrument resulted in the abandonment of any quantification and scaling in terms of Piaget's six stages (Uzgiris and Hunt, 1975). It is therefore left

up to the individual investigator to delineate the scale step and critical infant action that coincides with Piaget's stages. This may cause some variance in the determination of stage attainment, which could drastically alter the results. This information is typically not reported. In addition, no study has used all six scales of the Uzgiris-Hunt Scales, but have selected anywhere from 1 to 5 scales to use in their analysis, which leaves us with an incomplete representation of the cognitive structures.

One other serious consideration in the use of the Uzgiris-Hunt Scales is that the tasks for measuring different components of sensorimotor development are very similar to the tasks used to measure communications--for example, in the Development of Schemes for Relating to Objects, the highest critical infant action considered is naming objects! Only one study addressed this issue (Harding and Golinkoff, 1979) and devised an alternate task.

The second major methodological concern is in the definition and assessment of intentional communicative behaviors. The experimental task developed by Snyder and used in this study provides limited consistency across reported studies, but since there are no standard procedures for administration and scoring, much variance will occur. Several studies reviewed used completely different types of measures for language, such as size of lexicon.

In addition, although studies reviewed in Chapter II

suggested that only certain components of sensorimotor development correlate with vocal and gestural naming (Bates, 1979), little attention has been paid to the different functions for which communications can be used and how these may be differentially related to cognitive development. These results indicated statistically significant relationships for some subsets depending on whether or not the child was communicating to "show" or to "request."

These methodological questions point out some of the limitations of this study as well as others reported in recent literature concerned with the relationship between cognition and language. To summarize this research, there was no consistent finding regarding the relationship between cognition and language--either in terms of causation or shared origins.

Socialization and Language

The relationship between early language and socialization is perhaps less understood than other nonlinguistic factors. This study did not find a relationship between the amount of mutual play between the infant and his/her mother, or the frequency of maternal directiveness, with the level of communications used during the free play situation. Since these variables did not directly measure the type and frequency of the language input to the infant, it may be that this study did not address the most critical factor of mother-child interactions--the linguistic environment.

Similarly, the importance of socialization for language development may come prior to 18 months. Farran and Ramey (in press) found that middle-class mothers had an increased level of interaction with their infants between 6 and 20 months of age, while lower-income mothers did not show a similar interactional increase as the infant gets older. The realization that there may be differential contributions of nonlinguistic factors to language and communication development as a function of age could assist our research efforts and eventual results.

Overall Summary

Day care intervention did increase the HRE infants' frequency and level of communicating. The infants' communicative level was best measured in a task situation. The HRE infants' level of communicating was not as high in an interactional setting with their mothers. The experimental task situation eliminated the influence of the mother on the infants' communicative functioning. This situation was more like that of the assessment of general developmental function in which the HRE and MCC infants were found to be similar.

Implication for Exceptional Children

By measuring the effects of day care intervention after the first two years of development, this study supports the notion that environmental factors can positively

affect the development of early communicative development. One would anticipate that subsequent experience in a controlled environment would continue to support the development of these skills. If early intervention strategies with exceptional children are oriented toward promoting the development and use of communicative behaviors in a social context, continued development of more advanced language usage should result. The environment of the exceptional child must continue to be supportive and optimize language development. One would expect, then, that future research will identify a relationship between early communicative development and later language development, with evidence of continued differentiation between groups of children experiencing intervention and those remaining at home.

APPENDICES

Mother's Educational Level (last grade completed)	Weights	Father's Educational Level (last grade completed)	Weights	Family Income	Weights
6	8	6	8	1,000	8
7	7	7	7	1,001-2,000	7
8	6	8	6	2,001-3,000	6
9	3	9	3	3,001-4,000	5
10	2	10	2	4,001-5,000	4
11	1	11	1	5,001-6,000	0
12	0	12	0		

Other Indications of High Risk and Point Values

Pts.		
3	1.	Father absent for reasons other than health or death
3	2.	Absence of maternal relatives in local area (i.e., parents, grandparents, or brothers or sisters of majority age.)
3	3.	Siblings of school age who are one or more grades behind age-appropriate grade or who score equivalently low on school administered achievement tests.
3	4.	Payments received from welfare agencies within past three years.
3	5.	Record of father's work indicates unstable and unskilled or semiskilled labor.
3	6.	Records of mother's or father's I.Q. indicates scores of 90 or below.
3	7.	Records of sibling's I.Q. indicates scores of 90 or below.
3	8.	Relevant social agencies in the community indicate that the family is in need of assistance.
1	9.	One or more members of the family has sought counseling or professional help in the past three years.
1	10.	Special circumstances not included in any of the above which are likely contributors to cultural or social disadvantage.

Criterion for inclusion in high risk sample is a score $\geq$ 11.

APPENDIX B: MATERNAL OCCUPATIONS

	High-Risk Control	High-Risk Experimental	Middle-Class Comparison
Unemployed	1	1	5
Maid	1	4	0
Student	6	4	1
Clerical or Secretarial	0	1	1
Waitress or Store Clerk	1	2	0
Driver	0	0	0
Other	3	2	0
Child Care	0	0	1
Unknown	0	0	0
Professor	0	0	3
Nurse	0	0	1
Professional Other	0	0	2

APPENDIX C: COMMUNICATION TASK MATERIALS

1. Baby doll with bottle, hat, and blanket: "Physically correct girl baby" by Tynie Ruthie-Horsman (353)

2. Pail of blocks: "Baby's first blocks" by Crib & Playpen-Fisher-Price (414)

3. Toys cars with little people: "Play family little riders" by Fisher-Price

4. Paper plate, napkin, small round wafer and chocolate cookies

5. Small, clear plastic glass and whole milk in container

6. Small, plastic, colorful cars (5) in square, plastic freezer container: by K & K Toys

7. Drum and drumsticks: K & K Toys

8. Clear, two-quart Pyrex container with the following items in it: a purple squeaky toy, a small plastic car (like the above), a plastic tool (from a tool set by Sanitoy, Inc.), small plastic truck

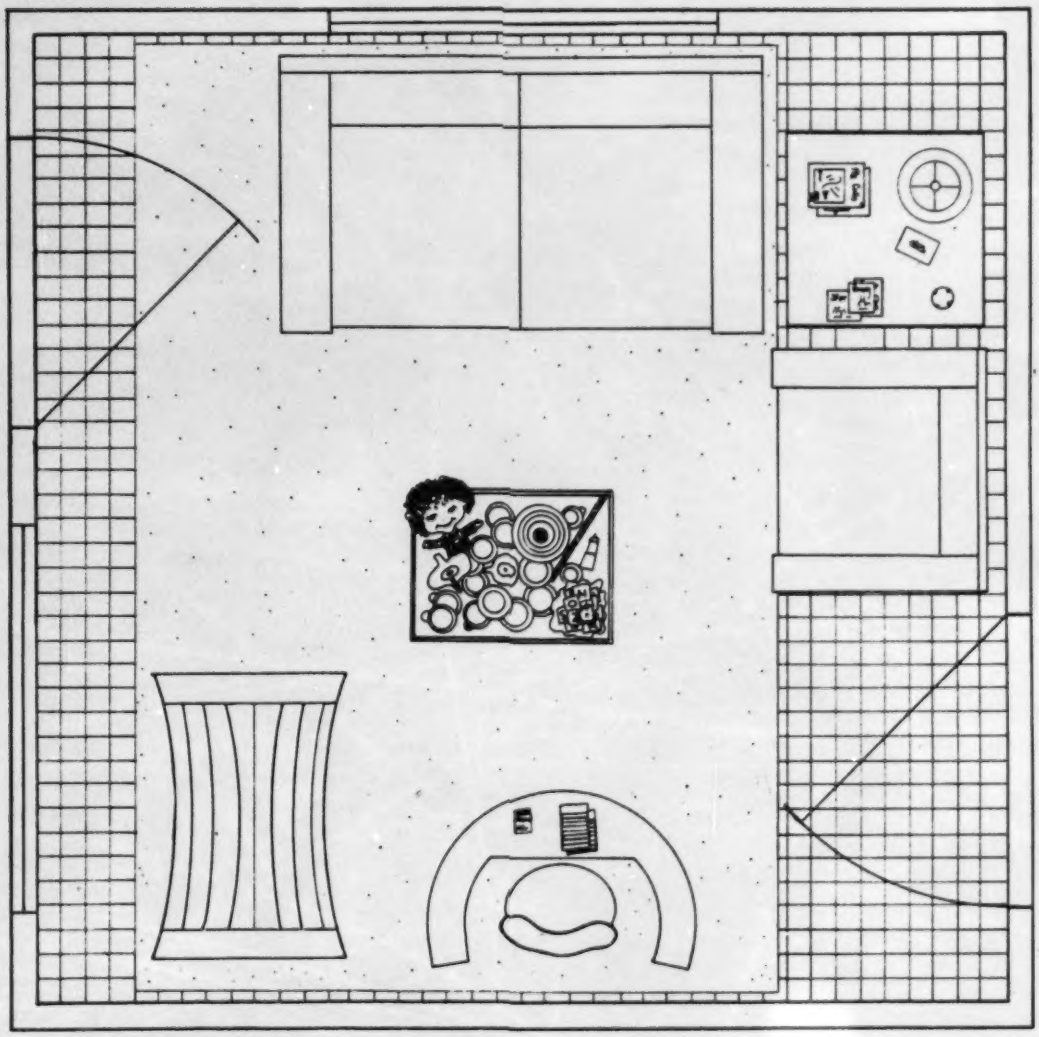
9. Big plastic truck: "Sand truck" by Plastic Toys and Novelty Corp.

10. Clear, two-pint Pyrex container with small, round cookies

Warm-up and extra toys:

Play dough by Kenner
Tool set by Sanitoy, Inc.
Play phone by Handicraft
Snap-lock beads by Crib & Playpen

APPENDIX D: DIAGRAM OF FREE PLAY SETTING



APPENDIX E: COMMUNICATION TASK PROCEDURE

Description of Room:

Furniture: The furniture remains the same as that used in the "teaching task", except that a yellow "parsons" table should be added. Arrange the small table and chair so that the chair is in the corner by the sofa and arm chair, with small table in front.

Toys and Materials: The cardboard toy box should contain the following--a baby doll with hat, bottle and blanket; a pail of blocks; a plastic container with toy vehicles and little people; a paper plate, napkins, and cookies; a small drinking glass and container of milk; a plastic container of 4 small cars; a drum and drumsticks; a clear pyrex container of cookies; a big yellow and orange dump truck; a clear pyrex container of toys (purple doll squeaker, yellow pliers, yellow car, red truck), plus warm-up toys (play dough, pop beads and toy telephone).

Equipment: Continue taping audio and video as for the other tasks.

Procedure

Prior to start of session, allow mother and child to go get a drink of water from the faucet for a slight break from previous sessions. Give child a cracker if desired.

Examiner then takes mother and child back to original testing room. Seat the child at the small chain in front of the small table. Mother may sit in the arm chair, slightly behind the child, and to the child's left. Examiner sits or kneels in front of child on the other side of the table. Behind the examiner is the box of toys, and to the side is the parsons table.

While seating the child, E explains the activity (communications task) to the mother:

"We would like to see how your child communicates that s/he wants something, like using words, pointing,

fussing. I have a box of toys here. I will give [child's name] a toy, and I will keep several other toys myself. We will then begin playing. I will try to see if [child's name] will ask me in some way for more of the toys. If [child's name] looks at you, ask, "What's the matter?" If [child's name] then indicates what it is that s/he wants, I will give it to him/her. If [child's name] asks me directly, I will also give the toy to him/her."

Warm-up: E sets out some play-dough for the child to play with as a warm-up activity. E models how to use the dough and interacts with the child, saying "look what I have!" Try to get the child to play with the dough. Up to five minutes should be taken, if necessary, to make the child feel comfortable and familiar with the E. If the dough does not interest him/her, then use the pop-beads and telephone as back-up activities for the warm-up.

#1--Baby doll, bottle & blanket

When the child appears comfortable with the E, remove the items from the table. Tell the child, "Now let's see what else I have in my box. Look what I have!" E pulls out the baby doll, blanket, and bottle. Model how to feed the baby, making sure the child is watching. Then say "Here, you do it" and give the child the doll, setting the bottle, hat and blanket on the parson's table, in the child's sight. Wait for the child to ask for the bottle.

The E should try to get the child to play with the

doll by encouraging the child to rock it, modeling again how to feed it, etc. If child indicates that s/he wants an item, say "What's the matter?" Wait for the child to repeat the request. Then give the item to the child. Let the child play with the toys for about a minute or two.

Then remove all the items from the table. Go on to item #2. Continue through each of the 10 items in a similar manner.

#2--Pail of blocks

E takes out the pail of blocks, shaking them so that they make a noise. Say "Look," to get the child's attention. Then, build a small tower with the blocks on the parson's table. Let the child see inside the pail. Then, give the child a block, and wait for him/her to ask for more. If necessary, build another tower with the extra blocks to try to attract the child's attention.

#3--Toy vehicles and little people

Set the vehicles on the parson's table with the little people in them. Take one and move it around, playing with it in front of the child. Then give the child the vehicle, setting the little people on the parson's table. If necessary, play with the vehicles and people on the parsons table to try to get the child to do the same.

#4--Empty plate and dish of cookies

Give the child an empty paper plate (or napkin) and

set a dish of cookies on the parsons table. If necessary, offer a cookie to the child's mother.

#5--Small glass and milk

This may be brought out while the child is still eating his/her cookie. Set the empty glass in front of the child, and place the carton of milk on the parson's table. If necessary, pour some milk in the glass to let the child see what it is, then pour back into the container.

#6--Cars

Open the box of cars and show the child what is inside. Put some on the parsons table and play with them. Then give the child one. If necessary, play with those on the parsons table some more in order to draw the child's attention to them.

#7--Drum and drumsticks

E should beat on the drum and show the child how to use them. Then give the child the drumstick and set the drum on the parsons table. Beat the drum if necessary to draw the child's attention to it.

#8--Clear jar of cookies

Simply give the jar of cookies to the child and wait for him/her to ask for help in opening it.

#9--Truck

Move the truck back and forth in front of the child,

then set it on the edge of the child's table, holding it down with your hand. Wait for the child to ask you to remove your hand so that the truck can be moved by the child.

#10--Clear container of toys

Simply give the container of toys to the child, and wait for him/her to ask for help in getting it open.

HINTS:

--Do not use the referent name for the toy when initially presenting it to the child, to prevent immediate imitation. Wait to see if the child will give you the name. If it appears that the child does not know the word, then you may use it.

--E may need to model how to play with the toys several times in order to draw the child's attention to it and get them interested in playing with it themselves.

--If the child does not respond to the item within a reasonable length of time (3-5 minutes) remove it and return to it once at the end, if possible.

--While waiting for the child to make a request, divert your eye contact, so that it is necessary for him to get your attention in some way.

APPENDIX F: COMMUNICATION CATEGORIES

Scoring Codes for Showing and Requesting (from Snyder, 1976)

SHOWING

1. Direct manipulation to get adult's attention: grasp, approach, reach, manipulate

2. Uses "showing off" to get the adult to smile, laugh, attend

3. Showing, giving and/or pointing to an object to get the adult to attend

4. Ritualized signal; gets attention of A first, by vocalizing & looking A and/or pointing, then brings adults attention to object

5. Uses a word to get adult to attend to object

REQUESTING

1. Child looks at, extends arm toward object OR
   Child looks at adult

2. Child looks at and fusses at the adult OR
   Child extends arm toward object, reaches, fusses, and/or points to object OR
   Child looks at and reaches for the adult's hand

3. Child points to and/or reaches for the object and then looks at the adult OR
   Child points to and/or reaches for the object and then looks at the adult's hand

4. Child does something to get the adult's attention first and then points to and/or reaches for the object, vocalizes

5. Child uses a linguistic symbol to indicate desire for the object

APPENDIX G: BAYLEY SCALES OF INFANT DEVELOPMENT: ITEMS USED IN LANGUAGE ANALYSIS

#101 Jabbers expressively

#106 Imitates words

#113 Says 2 words

#116 Uses gestures to make wants known

#117 Shows shoes or other clothing, or own toy

#124 Names 1 object

#126 Follows directions, doll

#127 Uses words to make wants known

#128 Points to parts of doll

#130 Names 1 picture

#132 Points to 3 pictures

#136 Sentence of 2 words

#138 Names 2 objects

#139 Points to 5 pictures

#141 Names 3 pictures

#146 Names 3 objects

#148 Points to 7 pictures

#149 Names 5 pictures

#158 Understands 2 prepositions

#162 Concept of one

#163 Understands 3 prepositions

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